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MAY 12, 1952

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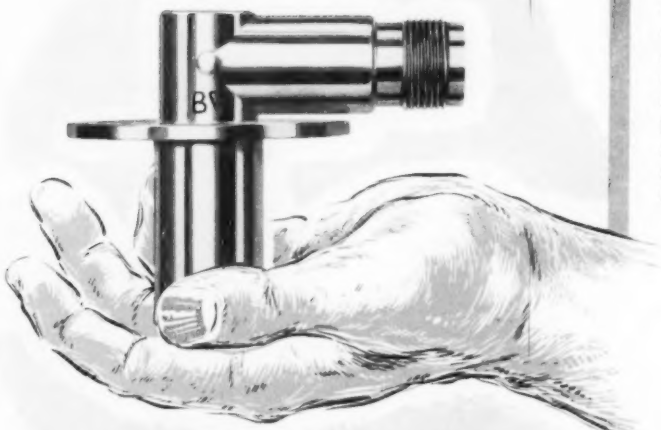

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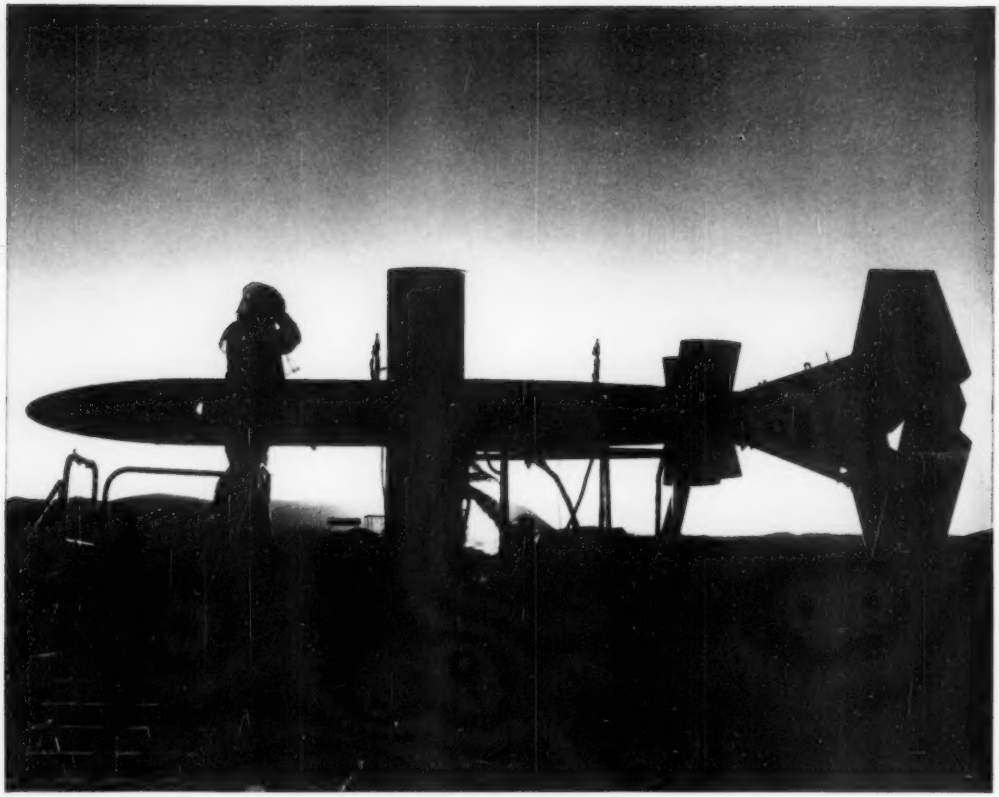

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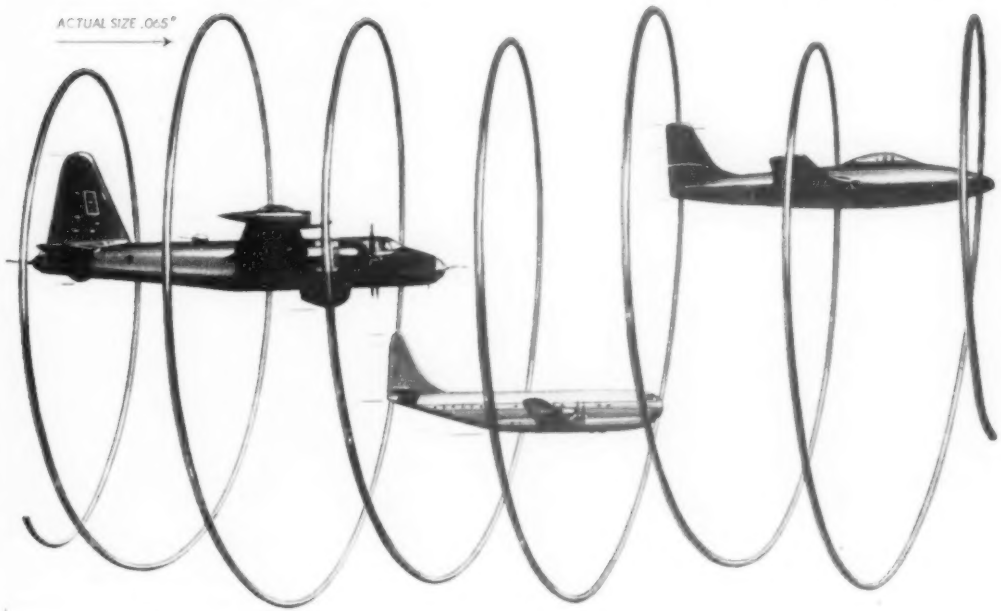

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Aviation Week

ABP Member ABC

Volume 56 — May 12, 1952 — Number 19

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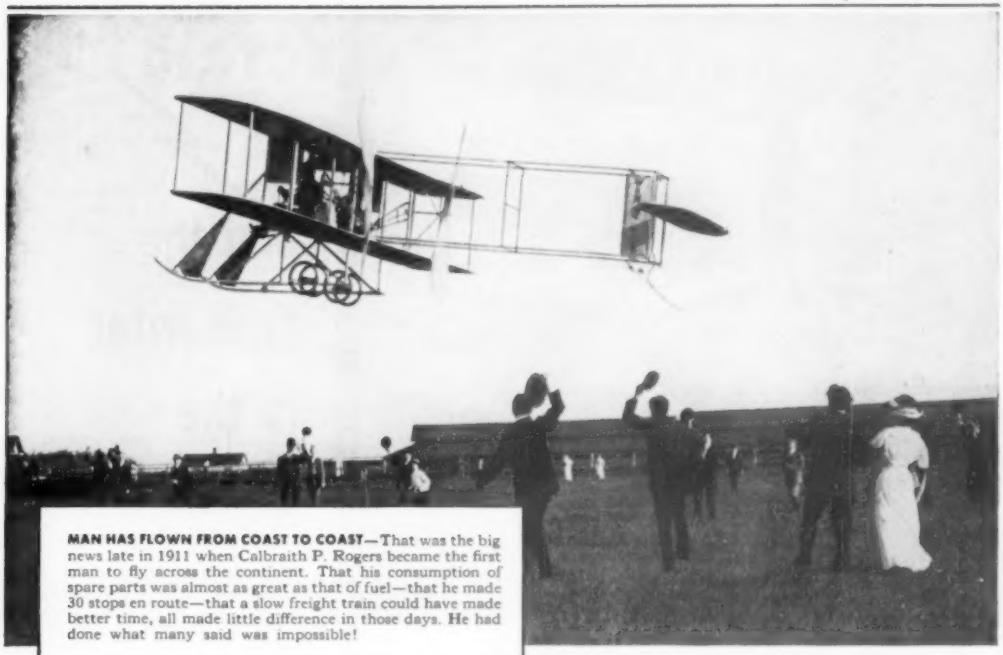
First Transcontinental Flight



MAN HAS FLOWN FROM COAST TO COAST—That was the big news late in 1911 when Calbraith P. Rogers became the first man to fly across the continent. That his consumption of spare parts was almost as great as that of fuel—that he made 30 stops en route—that a slow freight train could have made better time, all made little difference in those days. He had done what many said was impossible!

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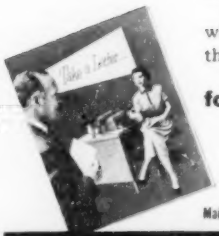

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NEWS DIGEST

DOMESTIC

Missing PAA Stratocruiser, which disappeared Apr. 29 on flight from Rio de Janeiro and Buenos Aires to New York, was found May 1 wrecked in dense jungle area in central Brazil. Aerial examination of wreckage indicates all 41 passengers and nine crew were killed.

CAA-industry evaluation of "centerline" system of runway approach lighting was completed last week; although CAA and Air Line Pilots Assn. favor the system, it is expected that USAF will fight attempt to make it a standard, although airline pilots make 94% of the instrument approaches in this country. (See Cockpit Viewpoint, p. 96)

Firm contract for production of bonded steel rotor blades has been signed by Prewitt Aircraft Co., Clifton Heights, Pa., and Piasecki Helicopter Corp., Morton, Pa. Blades are for Piasecki HUP-2. Details of the novel blades were carried in AVIATION WEEK May 5, p. 22.

James M. Eaton, 64, transport pioneer and former vice president of American Overseas Airlines, died May 1 in N. Y. C. He first became associated with commercial aviation in 1913, the following year helped establish an air service between Tampa and St. Petersburg, Fla.

Navy carrier planes can now carry atomic bombs "up to the largest size produced any place in the world," Vice Adm. John F. Cassady told a meeting of the Aviation Writers Assn. in Washington, D. C.

Punctured carburetor diaphragm definitely caused the crash of the U. S. Airline's C-46 into Jamaica, N. Y., some CAA and CAB investigators say, as reported in AVIATION WEEK Apr. 28, p. 81.

Gen. Hoyt S. Vandenberg went to Doctor's Hospital, Washington, D. C., last week for an abdominal operation after being stricken at his Pentagon office. Cause of the USAF's Chief of Staff's ailment was unknown at press time.

Some panicky passengers refused to leave the PAA DC-4 which crashed in the water off San Juan, Puerto Rico, last month, pilot told CAB investigators during the crash hearing. The crew reportedly got only one of three life rafts out of the crashed plane.

New phonetic radio alphabet set for official adoption by ICAO nations this summer is under criticism by the International Federation of Airline Pilots Assns., which says it has decided not to use it. U. S. and other pilots have said they would not use the alphabet.

FINANCIAL

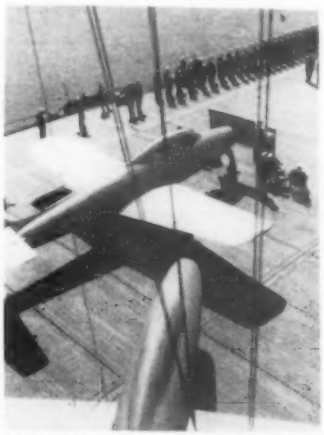
G. M. Giannini & Co., Pasadena, Calif., aircraft and missile instrument maker, reports sales of over $1 million sales of $2,571,379 for the entire year of 1951.

Jack & Heintz, Inc., Cleveland, reports net sales of $7,536,766 for the three quarters ended Mar. 31, with net income after federal income taxes of $222,962. Unfilled orders backlog is nearly $50 million.

Boeing Airplane Co., Seattle, had net earnings of $1,904,280 for the first quarter of 1952 after provision for federal and state income and excess profits taxes. Sales and other income for the period were $105,532,194.

Pan American World Airways, Inc., had net earnings of $6,546,000 during 1951 after provision for federal income taxes. Gross revenues were $188,560,000.

Aeroquip Corp., Jackson, Mich., reports net profits of $475,557 on sales of $10,089,220 during the six months ended Mar. 31; six months' sales represented a 72% gain over the same period the previous fiscal year. Total sales this year are expected to be near $20 million.



REPUBLIC F-84 with placard lashed to nose marks the 3-millionth ton of military equipment delivered under Mutual Defense Assistance Program. The photo was taken Apr. 30 aboard the carrier USS Tripoli which ferried a number of Thunderjets overseas for delivery to The Netherlands and Belgium.

Minneapolis-Honeywell Regulator Co., Minneapolis, had net sales of $135,150,517, in 1951, not $15,150,517 as reported in the Apr. 28 issue.

Ryan Aeronautical Co., San Diego, has declared a regular quarterly dividend of 10 cents per common share payable June 12 to holders of record May 22.

Garrett Corp., Los Angeles, had consolidated net sales of $48,765,554 for the nine months ended Mar. 31, with total net earnings after federal income taxes being $1,663,445.

INTERNATIONAL

National Aviation College in Indonesia will receive organization and operational assistance from the International Civil Aviation Organization's Far East and Pacific office in Melbourne, Australia. School would train Indonesian airline flight and ground crews. ICAO will also provide experts in personnel licensing, safety, communications and administration for the college.

Turnover of international air traffic transactions in the International Air Transport Assn.'s clearing house in London totaled $14,932,000 during February, compared with $10,261,000 for the same month of 1951. By offsetting credit and debit balances, 87.6% of the February transactions were settled without necessity of making any cash payments.

Linea Aeropostal Venezolana, has been awarded the Inter-American Safety Council annual Aviation Safety Plaque for the third consecutive year. LAV in 1951 flew 72,838,150 passenger miles without injury to passengers or crews.

Canberra twin-jet bomber crashed during a flight from Farnbough, RAE test center. It was the sixth Canberra to crash since last June.

Norwegian transport crashed and burned 150 miles southwest of Oslo with nine passengers and two crew reported killed and 10 others injured. The chartered plane carried 29.

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AVIATION CALENDAR

May 12-14—National conference on airborne electronics, co-sponsored by Institute of Radio Engineers' Dayton section and Professional Group on Airborne Electronics, Dayton Biltmore Hotel, Dayton, Ohio.

May 14—National aircraft technical committee, Aircraft Industries Assn., meeting, Hotel Statler, Washington, D. C.

May 14-16—Society for Experimental Stress Analysis national meeting, Hotel Lincoln, Indianapolis.

May 15-16—American Helicopter Society annual forum and banquet, Hotel Washington, Washington, D. C.; May 17-18, air show Bolling Field.

May 15-16—Aircraft Industries Assn. Board of Governors meeting, Williamsburg, Va.

May 16—National Armed Forces Day dinner, Hotel Statler, Washington, D. C.

May 17-18—National Pilots Air Meet and Races, Chattanooga.

May 19—International Air Transport Assn. technical committee and medical committee meeting, Copenhagen.

May 20—Institute of the Aeronautical Sciences meeting, Cleveland-Akron section, Cleveland.

May 21—International Air Transport Assn. financial committee meeting, Rome, Italy.

May 22—American Rocket Society dinner, Hotel Astor, New York.

May 22-23—Aeronautical Training Society annual meeting, Carlton Hotel, Washington, D. C.

May 31—Philadelphia Aviation Country Club annual spring regatta, Wings Field, Ambler, Pa.

June 1-3—Airport lighting conference and seminar, sponsored by American Association of Airport Executives, Deshler-Wallick Hotel, Columbus, Ohio.

June 1-6—Society of Automotive Engineers summer meeting, Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J.

June 3—Council for military aircraft standards, Aircraft Industries Assn., meeting, Hotel Statler, New York.

June 4-6—California Association of Airport Executives & California Aviation Trades Assn. conference, Stockton, Calif.

June 9-13—National Fire Protection Assn. annual meeting, aviation seminar on June 10, Hotel Statler, New York.

June 15-19—American Society of Mechanical Engineers semi-annual meeting, Sheraton-Gibson Hotel, Cincinnati.

June 17-19—Aircraft Trade Shows international exhibit of aircraft parts and equipment, Hotel Park Sheraton, New York.

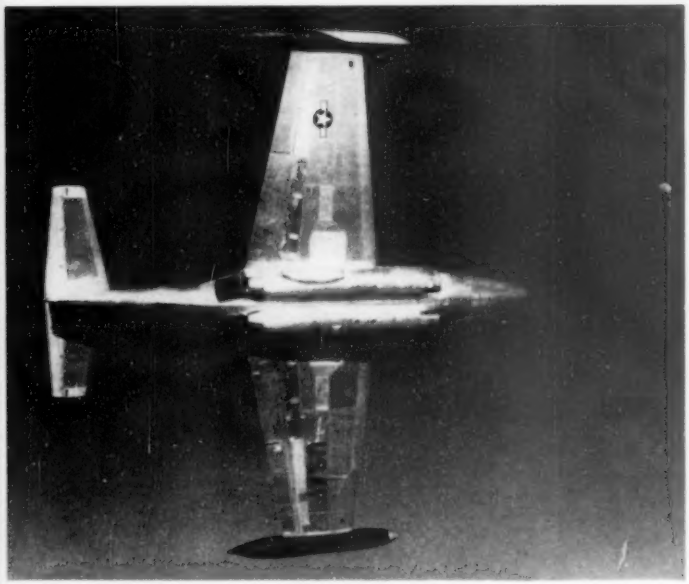
July 8-12—Aviation Writers Assn. annual convention, Ambassador Hotel, Los Angeles.

PICTURE CREDITS

7—Wide World; 9—(top) Boeing; (center) Northrop; (bottom) Hiller Helicopters; 14—Convair; 17—Wide World; 30—GE; 39—McGraw-Hill World News; 44-45—Douglas Aircraft Co.; 54—Fairchild Aircraft; 62—Howard Levy; 72—Trans-Canada Air Lines; 85—Sabena; 86—GE.

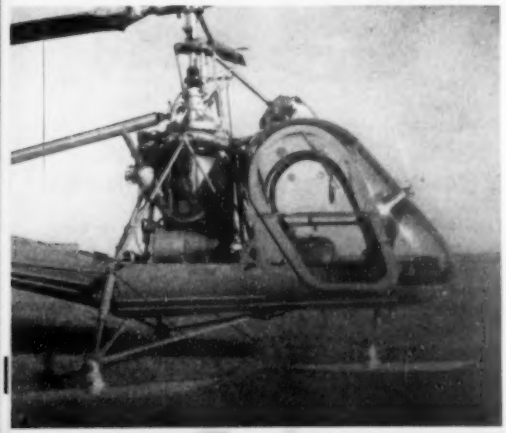
The Week's Plane News In Pictures

STRATOJET WING TANKS—Boeing's new B-47B Stratojet (right) is fitted with large external Ryan-built auxiliary fuel tanks under its wings, increasing the 93-ton medium bomber's range considerably. The B-47B also has more powerful 5,800-lb.-thrust J47-GE-23 turbojets. Former engines were rated at 5,200 lb. For production details of the new wing tanks see Aviation Week May 5, p. 29.



SCORPION AND THE MOON—Striking plan view (left) of a late model Northrop F-89 Scorpion all-weather fighter with a bright moon visible at two o'clock from the interceptor's nose. The six-cannon Scorpion is in service with the Western Air Defense Force.

HILLER DEVELOPMENTS—Photos below show a Hiller 360 helicopter (left) fitted with tricycle ski arrangement and a new HTE-2 Navy trainer in flight. Note fairing above the cabin around the rotor control stick of the 360. HTE-2s are in production for Naval Reserve units being activated at numerous bases in the U. S.



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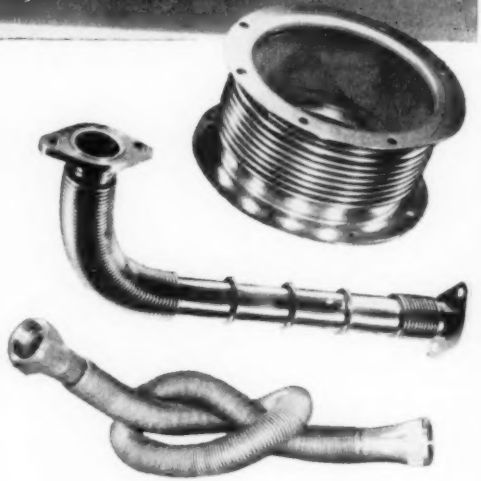

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WHO'S WHERE

In the Front Office

F. E. Newbold, Jr., general manager of Fairchild Engine & Airplane Corp.'s Stratos division, has been named a vice president of the parent corporation.

Robert E. Wieland has been made regional vice president of National Airlines, in charge of operations for the New York area. He had been vice president in charge of foreign operations since late 1949. **Callous D. Kinnard** is taking over foreign operations and has been transferred from Havana to New Orleans.

Gareth W. Speer, Piasecki Helicopter Corp., has been elected financial vice president, in addition to his post as treasurer. Speer has been treasurer for about one year, came to PHC from Kaiser-Frazer Corp.

Changes

S. K. Andersen has been promoted to chief engineer of AiResearch Mfg. Co., Los Angeles; **Ivan Speer** has been named engineering manager of AiResearch, Arizona. Speer replaces **Arthur J. Phelan,** who returns to AiResearch, Los Angeles, as staff engineer.

William P. Stratton has been appointed manager of contract administration and director of advertising and sales promotion for Transco Products, Inc., Los Angeles, makers of mechanical and electronic aircraft components.

Patrick J. Sullivan has been made director of public relations for the Electric Boat division, Electro Dynamic division and Washington, D. C. office of General Dynamics Corp.

William G. Gisel has been made controller for Bell Aircraft Corp.

Donald C. Markey has been named chief of the contracts and purchasing activities of the Aircraft division of Dept. of Defense Production, Ottawa.

J. Howard Batchelor has been designated general manager of U. S. Honing Co., Long Beach, Calif., specialists in internal honing of hydraulic cylinders for aircraft and allied industries.

R. A. (Dick) Stickney has been made production superintendent of Aviation Accessories, Inc., Ft. Worth, Tex.

Peter G. Verhoeven, Jr., has joined the sales division of Goodyear Aircraft Corp. as staff representative in the subcontracts department. He will represent the firm from its Los Angeles office.

A. O. Jarvis has been named supervisor of fleet service at Northwest Airlines' Holman Field overhaul base, St. Paul, Minn. He replaces **L. E. Koerner,** who has been made NWA maintenance division manager.

Mayo Thomas has been appointed manager of The Flying Tiger Line's new International Sales Department.

Donald K. Zeiner has been named office manager for Braniff Airways in Houston, Tex.

INDUSTRY OBSERVER

► Temco is considering a plan to build 100 of its T-35 trainers on speculation for delivery in 1953. Meanwhile, Air Force is continuing competitive evaluation of the T-35 vs. the Beech T-34 at Goodfellow AFB, Tex. Temco says it has had foreign offers for both trainer and tactical versions of the T-35.

► Despite Navy and Air Force desires not to depend heavily upon a single manufacturer's engine—as was the case with the Pratt & Whitney R-2800 piston engine during World War II—the same pattern is shaping up again. Virtually all new USAF jet aircraft are planned for Pratt & Whitney J57 installation. Now Navy is experiencing so much difficulty with production problems of the Westinghouse J40 that it is contemplating switching the tailless Chance Vought F7U interceptor from J46 to J57. The Douglas A3D twin-jet engine bomber scheduled for J40 installation may similarly switch to J57. The Air Force RB-66 version already is scheduled for J57s as is Convair's delta-wing fighter XF-102. This probably will result in production contract to a third source for the J57 among the automobile manufacturers.

► French government has asked the U. S. to finance production of the Dassault "Mystere" fighter (said to have a performance on par with the F-86) in France under terms of Mutual Defense Assistance Program. The French are asking U. S. to pay for facilities and equipment for production and the French would build the planes to contribute to NATO air forces. Two years ago, the French committed themselves to supplying approximately 1,000 aircraft for NATO during an ensuing 5-year program. To date about 200 have been produced, most of which are obsolescent de Havilland Vampire fighters built under license and powered by Rolls-Royce Nene engines produced by Hispano.

► A more precise method of measuring fuel flow in the Boeing Flying Boom aerial refueling system has been developed, utilizing the Doppler effect. Previous measuring methods have not been capable of accounting accurately for altitude and temperature variations and high fuel-flow rates. Thus it was difficult to fully top off the receiver plane's fuel tanks safely and resulted in lowering the system's effectiveness.

► Convair's XF-92A delta-wing fighter prototype of the supersonic interceptor XF-102, now flying at Edwards AFB, Calif. is a consistently good performer at transonic speeds, it is reported. Observers also report the plane "an excellent performer at low speeds down to 60-70 mph, without showing any break in its lift curve.

► Canadair is readying final design studies of its Model 21, a high-wing, medium-range twin-engine transport. Considered by Canadair as "replacement for the DC-3," the craft is expected to carry 32 passengers and cost under $450,000. Estimated cruise performance is 220 mph. at 5,000 ft. Gross weight is pegged at 32,000 lb. Wright C9HE engines rated at 1,500 hp. at takeoff are design powerplants.

► Los Angeles Airways has contracted with Pacific Airmotive Corp. for maintenance overhaul of Pratt & Whitney R-985-B4 engines which power LAA's Sikorsky S-51 helicopters.

► McDonnell Aircraft Corp. has delivered the last of its F2H-2 Banshee twin-jet fighters to Navy, but continues production on later F2H-2P photo recon and larger F2H-3 versions while preparing production of the new sweptwing F3H-1 Demon jet fighter for Navy.

► Okanagan Air Service, Ltd., Vancouver, B. C., recently took delivery on its first Sikorsky S-55 for use at a project of the Aluminum Co. of Canada, 500 mi. north of Vancouver. It was the first commercially licensed S-55 delivered outside the U. S. Meanwhile, Army's 6th Transport Helicopter Co., Ft. Sill, Okla., has received its first Sikorsky H-19, military counterpart of the S-55.

Washington Roundup

Taft's Air Power Backers

Three top retired air officers are backing Sen. Robert Taft's campaign for all-out emphasis on air power in the defense buildup. Taft's criticism of the Administration's approach in a political speech: "The same old-fashioned obsession for ground combat is dominating. . . ."

Concurring with Taft:

• **Adm. Louis Denfeld**, former Chief of Naval Operations: "It is important that we be prepared to put an iron ring around the Russian Iron Curtain in the event of an emergency, that ring to consist of Air Force land-based planes and Navy aircraft carrier-based planes. The Navy and Air Force are our first line of defense, as we cannot expect to compete with large land armies on the continent of Europe and Asia."

• **Lt. Gen. Harold George**, former commanding general AAF, Military Air Transport Command, now vice president of Hughes Aircraft Co.: "Your exposition of the concept of air power in the defense of this nation must be our military policy if this country is to survive in its battle against communism."

• **Lt. Gen. Hugh Knerr**, former Air Force inspector general: "The way to get the military policy (of all-out emphasis on air power) that you so accurately appraise as essential to maintenance of American liberties is to abolish the Joint Chiefs of Staff as a failure and substitute the single general staff . . . strongly advocated within the military forces up to the time the Joint Chiefs of Staff idea was adopted. Such a single general staff, with sections for the Army, Navy, Air Force and industry reporting through a single Chief of Staff to the Commander in Chief and the Congress, will insure an end to military waste and professional jealousies."

Naval Air Backs Stretchout

Top Naval Airmen are solidly backing the Administration's stretchout of aircraft production—although they will oppose the further stretchout that would be necessary under the $150-million cut the House made in the $3.8 billion the Administration recommended for Naval aircraft procurement over the coming fiscal year, which starts July 1.

They expect the Administration's stretchout to make for a more orderly program, permitting design changes for improved performance throughout. Navy has no plans to freeze models.

Comment on the Administration's stretchout:

• **Deputy Chief of Naval Operations for Air, Vice Adm. John Cassady:** "We have leveled the hump; there is no undesirable peaking of requirements for men and materials."

• **Rear Adm. Thomas Combs, Chief, BuAer:** "The decision to rephase our production schedules over a longer time span should prove particularly beneficial to the aircraft industry, because under the revised schedules production no longer will have to be pushed up to a high peak for a short time and then reduced sharply to the long-term sustaining level. Further, this rephasing has given us more time for the proper introduction of necessary design changes which are essential if we are not to produce a large volume of aircraft which may become obsolescent prematurely in terms of their capability against enemy aircraft."

Air Force leaders are less enthusiastic about the Administration stretchout. But in congressional testimony, Secretary for Air Thomas Finletter supported it, and USAF's Chief of Staff, Gen. Hoyt Vandenberg, with a moderate show of reluctance, also is going along.

Both Finletter and Vandenberg, however, are opposing the further stretchout of aircraft production that would be necessary if the House cut of $560 million in the $12.6 billion recommended by the Administration for coming 1953 fiscal year aircraft procurement stands.

Opposition to Air Navy

Some air admirals are antagonistic to the proposal that the Chief of Naval Operations and all fleet commanders be airmen.

Retired Adm. Frederick Sherman, commander of the Lexington in the Battle of the Coral Sea and one of the brilliant tacticians of World War II, is urging Congress to pass legislation requiring this.

But other Navy Airmen view the plan as the stepping-stone to a merger with the Air Force, in which the Navy would be submerged in status. They point out that once all Navy's top commands are held by airmen, Navy will become known as a second air force, setting the stage for establishment of a single, dominant air arm, supported by auxiliary ground and sea forces.

Out of Navy's 287 admirals on active duty, only 81 are airmen. And only one of the Navy's four fleets is presently commanded by an airman: the Pacific Fleet under Vice Adm. Arthur Radford.

Too Many AF Generals?

Strong pressure is developing in Congress to hold down the officer strength of the services, particularly the number of admirals and generals.

House Armed Services Committee will start hearings on legislation soon.

Meanwhile, a stipulation tacked onto the 1953 military budget by the House limits the number of officers with the rank of captain or lieutenant or higher according to a percentage of total military strength.

There is speculation as to what the stipulation might mean—whether it would just slow down promotions or actually result in demotions. House Armed Services Committee wants to replace it with well-considered legislation.

Data on officer strength of the services under programs for the coming year shows USAF to have the greater proportion of both generals and other officers:

• **Air Force.** 457 generals, or one out of every 2,321 military personnel.

• **Navy.** 287 admirals, or one out of every 2,909 military personnel.

• **Army.** 520 generals, or one out of every 2,980 military personnel.

• **Marine Corps.** 60 generals, or one out of every 4,062 military personnel.

• Officer strength in general:

• **Air Force.** 142,616 officers, or one out of every 7.4 military personnel.

• **Navy.** 80,769 officers, or one out of every 10 military personnel.

• **Army.** 127,300 officers, or one out of every 12 military personnel.

• **Marine Corps.** 19,824 officers, or one out of every 12 military personnel.

—Katherine Johnsen

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Further Air Power Stretchout Is Opposed

- **All-out effort is made to restore House cuts.**
- **Vandenberg and Bradley warn of Soviet buildup.**

By Aviation Week's Washington Staff

One grave warning followed another last week to the U.S. Senate as top military leaders made an all-out effort for restoration of the House-imposed cuts on U.S. air power and other military resources.

Air Force Chief of Staff Hoyt S. Vandenberg warned that Russia's air force is now larger than ours and is fast approaching ours in quality under the huge manufacturing program now underway there.

▶**Crippling Effects**—"Unless the crippling effects of the House action are undone, this narrowing margin will shrink to nothing in the next two years and control of the air with all that it implies will then be within the grasp of the Soviet Union," Vandenberg testified to the Senate.

Gen. Omar Bradley, Chairman of the Joint Chiefs of Staff, warned that Soviet advances in atomic warfare and industrial mobilization had now reached a point where "Russia might risk a major aggression."

Mid-1954 was indicated as the danger point deadline, and stretchout of the U.S. air power buildup called for by the House cuts would take our readiness far beyond that time, possibly to 1957, the military leaders said.

▶**Plants to Close**—Eight major aircraft production facilities (whose names were not disclosed) will be closed if House cuts in the 1953 Air Force budget are not withdrawn, Air Force Secretary Thomas K. Finletter warned in strongly worded testimony before the Senate Appropriations Committee.

Six of the plants to be closed are already in operation and two others are scheduled to open soon as part of the USAF's broadened industrial mobilization base plan, which will be seriously damaged, overall, if the House cuts go through unchanged.

Specifically, Finletter asked for restoration of $1,644,420,858 carved from the Air Force budget. This includes $560 million for aircraft and related procurement; $300 million for major procurement other than aircraft; $627,681,858 (of an original estimate of $628,026,858) for maintenance and operations; $167,739,000 for military personnel; $10 million for National Guard, and another $10 million for "contingencies." Air Force did not ask for restoration of $2.2 million slashed by the House for reserve activities.

▶**What It Means**—The Air Force Secretary also asked that Section 638 of House Bill 7391, the Military Appropriations Bill for 1953, be deleted. This section would limit actual expenditures by the Defense Department to $46 billion for the fiscal year 1953. If this ruling is approved, he said, USAF would be allocated only $174 billion of the total.

If the House-imposed $17.4-billion ceiling for Air Force expenditures in 1953 is approved this is what it will mean:

- Loss of approximately 3,000 aircraft during the period Jan. 1, 1953 to June 30, 1954.
- Closing of eight major production facilities, of which six are already in operation and two are about to open. This seriously affects USAF's mobilization base.
- Drastic cuts in ammunition below amounts Air Force considers to be necessary and on hand at all times.
- Severe cuts to USAF combat wing electronic and maintenance equipment programs. This includes deferral of ground support and maintenance equipment for aircraft and the ground electronic equipment for the control of aircraft for U.S. defense beyond fiscal 1953.
- Reduction in planned personnel force of 1,061,000 to 964,200, representing a 10% cut of the proposed overall strength of USAF. The personnel cut will undermine the 143-wing structure because USAF has programmed a 50% increase in striking power, building from 95 wings to 143, accompanied by only a 13% increase in personnel. Net result will be deletion of 21 air bases.
- Slashing 1 million flying training hours due to reductions in funds available for procurement of spares and spare parts, aviation gasoline and oil.

▶**Stretching the Stretchout**—Finletter declared that if the proposed slashes are approved the timetable for the proposed 143-wing Air Force will be extended from July 1, 1954, into the first half of the calendar year 1957. This will be, he said, "a major blow to our air power. It would increase the chances of war and it would make this country vulnerable in the event war should come."

In documentation of the Air Force position, Finletter told the Senate that the Joint Chiefs of Staff approved 143-wing Air Force divided among the three front-line forces of the Air Force operation.

"The Air Defense Command," he said, "was allocated a certain number of interceptor fighter wings. These interceptors, along with the anti-aircraft

Policy Commission Is Set Up

Establishment of a new Production Policy Advisory Commission to advise the Defense Department and the Office of Defense Mobilization on long-range production policy and scheduling problems last week promised a major change in the Washington defense mobilization setup.

First two of the seven-man commission to be named were Harold Vance, board chairman and president of Studebaker Corp., and H. Clay Bedford, president of Chase Aircraft Co., who has just relinquished his post as Special Assistant for Production to Defense Secretary Robert Lovett. Charles Stauffacher, staff director at ODM, is named executive secretary.

Meanwhile DPA Administrator Manly Fleischmann assigned his deputy, William L. Campbell, to take over as acting chairman of the Aircraft Production Board, succeeding Harold (Bill) Boyer who resigned. It is generally understood that the Campbell appointment is an interim arrangement, since he is expected to leave government service June 30.

artillery and the radar screen, were carefully calculated with respect to the information given by intelligence as to Russian capabilities in mid-1954. Any cut in this minimum figure would increase the chances that Soviet bombing attacks would get through in greater numbers and would let loose atomic bombs in greater quantities on the United States.

"A certain number of these 143 wings (126 wings plus 17 troop carrier groups) were assigned to the tactical air operation, of which the bulk was assigned to the NATO defense force. They are part of the NATO buildup. Our committment to have them by mid-1954 is part of our arrangements with our NATO allies and these in turn are based on a calculation of Soviet strength in relation to Allied strength in Europe by mid-1954."

► **Requested Funds**—Original request of the Defense Department for military obligational authority totaled $55 billion. This would have assured—with $21.4 billion to USAF—an elective 143-wing Air Force by July 1, 1954.

This request, as finally submitted by the President to the House, was pared to $52.4 billion. Of this revised budget estimate, Air Force would be allocated $20.7 billion. Resulting reduction proposed by the President extends the date of readiness of the 143-wing Air Force from July 1, 1954 to July 1, 1955.

"This decision," Finletter declared, "was made for fiscal reasons, and from the military point of view contains an important element of risk by delaying the date of readiness beyond the critical point of 1954.

"Then," he continued, "the House made two types of limitations on the $20.7-billion figure. In the first place they cut the obligational authority from $20.7 billion to $19.2 billion, and then imposed the limitation of Section 638 which would limit USAF spending during fiscal 1953 to $17.4 billion.

"Effect of these two blows from the House is to move the date of readiness of the Air Force from 18 months to two years in the future. The 143-wing force will reach completion only during the first half of the calendar year 1957.

New AMC Finance Setup Cuts Cost

By Byron C. Dempsey

Dayton, O.—Air Materiel Command is running close to schedule on a predicted annual savings of $3.5 million on Air Force contract discounts, realized by establishment of finance offices located near heavy industrial areas.

Cumulative records at the end of March, 1952, reveal a total savings of $2,372,303—of a maximum possible for the period of $2,448,733.

Officials of the finance network at AMC feel they will come close to hitting the $3.5 million estimate in the current fiscal year. April, May and June (last fiscal quarter) figures may top the predicted goal, due to short delivery contracts to be let during the remainder of the fiscal year.

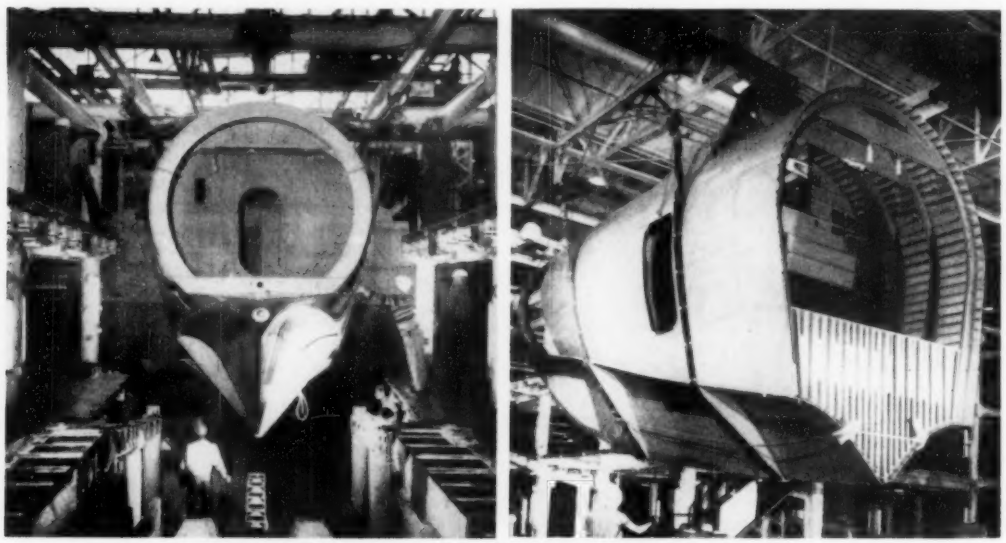
► **Delays Ended**—Before Air Force assumed payments on its own contracts, backlogged invoices in the Army Finance office were the bane of existence of contractors among the armed services. It was too big an operation to be efficient. Another contributing factor was a ruling that an invoice either would be paid or returned to the source of origin within a few days. Since another "ground rule" provided that the invoice could not be paid without the receiving receipt from the depot to which the contracted articles were shipped, there was a considerable additional delay in many payments.

The new AMC plan provides for holding at the installation the manufacturer's invoice until the receiving acknowledgment arrives. Payment then is made in accordance with contractual terms.

Decentralized finance offices now are located in Air Procurement District, Air Materiel Area and AF Specialized Depot offices. These offices frequently are able to make payments in from 24 to 48 hr. after receipt of invoices.

► **Payment**—Contractors can do two things to facilitate payment. Finance division officials pointed out:

• First, if the contractor has one or more questions on the financing of his contract, he should consult the finance office nearest his plant or home office.



FIRST PRODUCTION R3Y NOSE SECTION LEAVES JIGS

Two views show first production nose section of Convair's R3Y turboprop-powered flying boat being lifted from its giant jigs at San Diego. Clean hull lines of the 80-ton Navy cargo plane are readily evident in these pictures. Powered by four Allison T40 engines, the R3Y will have a top speed of over 300 mph. It is the production version of the XP5Y-1 which has flown.

Most likely that office will be handling his contract payments anyway, and the contractor can obtain authentic information generally quicker through that medium than by traveling to Dayton. Every contract carries the name of the finance office which has been designated to make payments.

• Second, use the contractual nomenclature on shipping invoices for items shipped to the various depots.

▶ **Finance Offices**—A complete list of locations of finance offices:

Wright-Patterson AFB, Ohio; Tinker AFB, Oklahoma City, Okla.; Eastern Air Procurement District, 655 Madison Avenue, New York 21, N. Y.; Kelly AFB, San Antonio, Tex.; McClellan AFB, Sacramento, Calif.; Robins AFB, Macon, Ga.; Western Air Procurement District, 155 West Washington Boulevard, P. O. Box 3849, Terminal Annex, Los Angeles 54, Calif.; Hill AFB, Ogden, Utah; Brookley AFB, Mobile, Ala.; Norton AFB, San Bernardino, Calif.

Mid-Central Air Procurement District, 165 North Canal Street, Chicago 6, Ill.; Olmsted AFB, Middletown, Pa.; Central Air Procurement District, West Warren Avenue & Lonyo Boulevard, Detroit 32, Mich.; Northeastern Air Procurement District, 14 Court Square, Boston 8, Mass.; Southern Air Procurement District, 3309 Winthrop Avenue, P. O. Box 9038, Ft. Worth 7, Tex.; Mallory AFB, Memphis, Tenn.; Wilkins AFB, Shelby, Ohio; AMC Finance Office, Empress Building, 1916 Second Avenue, Seattle, Wash.

AF Looking for New Fast Trainer

The Air Force has announced an aircraft manufacturers' design competition for a side-by-side trainer tentatively designated TX, with interceptor-class rate of climb, 35,000-ft. service ceiling and gross weight limit of 5,000 lb.

The announcement has manufacturers searching for a design that will even approach it with presently projected powerplants.

The field is wide open, and practically every manufacturer that has ever been interested in trainers has a design team striving to come up with an entry by the June 16 deadline which has been set by USAF.

Observers see probable delays in the closing date, however, because of the powerplant problem. AF asks for one alternate turboprop design, even though conventional engines may be necessary in early production. Most likely engine for this is the 1,350-hp. Armstrong Siddeley-licensed Mamba, scheduled for production at Curtiss-Wright Corp. Reciprocating engines some companies are considering include the Wright R-1300 and R-1820.

Possibility of attaining some of the performance sought is seen with a high-powered version of the North American T-28. However, the weight requirement is much lower.

Prominent among contenders for the TX contract are expected to be Beech, Temco, Fairchild, North American, Convair and Boeing.

Deficit Changing Air Mail Trend

Some support is given cargo airlines' plea to carry mail, but overall cost is the prime problem.

By Katherine Johnsen

Washington developments point to a changing pattern of air mail operations.

Trend is away from the present system of blanketing virtually all points in the country with mail service by passenger-cargo-mail planes. Instead, some thinking in Congress and at Post Office Department is that more long-range mail business should be shifted from railroads to the airlines for transport on efficient all-cargo planes, and much of the short-range business should be left to surface carriers, particularly trucks that could make pick-ups at airports.

Key factor in the situation is Post Office's $500-million-a-year operating deficit. Assistant Postmaster General John Redding has been given the assignment of drastically reducing the deficit and putting the department on a more nearly self-supporting basis.

▶ **Cost Rate**—Legislation separating air mail pay from subsidy, for the first time relieving Post Office from any obligation to pay airlines more than a cost rate for mail service, will pave the way. The measure, already passed by the Senate, is due for action by the House shortly.

Showdown will come when Post Office requests legislation permitting it to contract for air mail service at rates lower than those established by CAB. This will be submitted to Congress soon, according to the department. Action this session is not likely, though. Meanwhile, the department is opposing a provision in the Senate-passed separation bill which would restrict its discretion to transport air mail by surface means over short hauls when the service would be more efficient.

Developments are:

• **Post Office** is now completing a study on the feasibility of increasing the volume and speed of long-range mail shipments by air.

• **Coinciding** with this is the proposal of the three certificated freight carriers —Slick Airways, the Flying Tiger Line and U. S. Airlines—to carry air mail and air parcel post, as well as air express, at rates based "on the actual cost of rendering the service"—which a spokesman for the carriers put at approximately 20 cents a ton-mile. This compares with the 45-cent rate of the Big Four, and the higher service rates that have been established for other carriers.

• **The department** is now pushing a program to increase mail business with the trucking industry, which could be dovetailed with the proposal of the three carriers.

Post Office Department estimates that by contracting with truckers for shorthaul business formerly carried by the rails it has reduced its operating cost by $25 million a year in the first year of the program. Within the next few years, Post Office hopes to bring down its operating expense by $100 million a year through the program.

Rails have not fought the shift in mail business. The industry has voluntarily abandoned many of the shorthaul routes, now operated by truckers, as uneconomical. Some observers expect a parallel development in air transportation, pointing out that shorthaul transportation is even less adapted to airlines than to railroads.

In applying to Civil Aeronautics Board to expand their operations to air mail and air express, the three freight lines pointed to their record of spurring the development of air freight. In 1951 the three carried 101 million ton-miles, or more than the 100 million carried by all the domestic passenger lines, and substantially more than the 78 million carried by the Big Four.

▶ **Volume Up**—Under the impetus of competition, it was pointed out, air freight volume of the scheduled domestic lines has increased a hundred-fold in the past half decade, from 1.2 million ton-miles in 1945. But the domestic air mail volume on which the scheduled lines have a monopoly has declined from 65 million ton-miles in 1945 to 63 million in 1951, and the air express volume has only doubled, increasing from 20.5 million ton-miles in 1945 to 40.9 million in 1951.

Air Transport Assn. promptly challenged the air freight lines' proposal to carry mail at approximately half the rate being paid to the Big Four, claiming it could only be done by "skimming the cream" and operating only between major traffic centers.

▶ **Surprise to ATA**—Commenting that it came as "a complete surprise," ATA's general counsel, Stuart Tipton, pointed to Slick and Flying Tigers advertisements stating they could give freight customers better service than the scheduled lines because they didn't have to give priority to passengers and mail. The ads read: "Because Slick carries airfreight only there are no delays or 'offloading' of shipments due to passengers, mail or express priorities. All schedules are designed to meet the

needs of shippers." And, "Air freight is our exclusive business—there's no competition from mail, passengers, or express—so your freight has top priority from door to door 365 days of the year."

Convair-Kaiser Merger Doubtful

It now appears that the Convair, Atlas, Kaiser-Frazer merger will not materialize. After the close of a recent Atlas Corp. stockholders meeting in New York, company president Floyd Odlum, also chairman of Convair's board of directors, said that unless some answers were found to certain obstacles to the merger—and that these answers weren't evident now—the merger did not appear feasible.

But apparently the door to the three-way hookup hadn't officially been slammed shut.

In a statement which was circulated to stockholders just before the meeting, Odlum said that Atlas, Convair and independent experts had made careful checks. Odlum stated that the independent reports had just come into his hands, that his own analysis had just reached the final stages of completion, and that Convair's and Atlas' boards hadn't yet seen these analyses and reports. Odlum said: "Therefore, it can only be said as of today that no conclusion has as yet been reached."

▶**Obstacles**—He pointed out that certain serious obstacles existed to the merger of the three companies. He mentioned one:

"The vagaries of the Excess Profits Tax Law as applied to this situation are such that, so far as I have been able to analyze the situation to date, any basis of allocation of securities that would be acceptable to the stockholders of Convair in order to assure them at least a continuance of the earning power they could reasonably expect on their own would undoubtedly prove unacceptable to the stockholders of Kaiser-Frazer Corp.

"This is because the giving of this amount of stock to Convair would seriously cut the Kaiser-Frazer per share earning power based on the same assumption as to the earnings of the consolidated company after taxes. I am not referring to the next year or two because in these cases one must peer into the longer future. I am referring to the years beyond 1954. This peculiar result where in effect three plus three make four is primarily because a given assumed earning power in these years for Kaiser-Frazer alone would bear only the normal income tax rate whereas the same earnings in the merged company would be superimposed on the earnings of Convair and would have to bear a higher tax rate."

Safety Shuffle

- **CAA divorces engineers from maintenance.**
- **And that action is called serious threat to safety.**

(Editor's note: This is the third in a series of articles analyzing CAA's Office of Aviation Safety, its policies and key personnel.)

By Alexander McSurely

Separating maintenance from engineering in aviation is like separating pistons from cylinders—neither is effective by itself.

And that's why critical analysis of the reorganization of CAA's Office of Aviation Safety points to the separation of maintenance from engineering as the most serious and potentially dangerous flaw in the recent reshuffle of the men charged with protecting this country's air safety.

▶**Eight-Year Setback**—Long-time observers of the various moves and countermoves which have been made in the big federal aviation agency under the name of "reorganization" say that the recent Office of Aviation Safety changes have set the technical supervisory offices back some eight years to where they were in 1944 before Administrator T. P. Wright approved a plan putting maintenance under engineering in CAA.

Under his successor, D. W. Rentzel, the CAA's non-technically trained old guard succeeded in getting this forward step undone, as far as the regional offices of CAA are concerned. In the regions, maintenance was put under operations, separated from engineering about three years ago. And now, the latest reorganization has completed the job by separating maintenance from engineering in the Washington office of CAA.

Some transport industry analysts of the new split between maintenance and engineering say the separation doesn't make much difference to them. They deal with the same people in Washington, and whenever a maintenance problem involves engineering they take it to the same engineering people they have always dealt with, and appear to get the same results.

But individuals come and go in CAA.

What the easily satisfied industry people appear to overlook is the long-time potentially hazardous consequences of a CAA setup in which maintenance reports now go to engineering only when the maintenance organization thinks they should go.

▶**Hot Wire Story**—Illustrating the dangers of the division, there is a story which goes back to a new transport airplane certificated with an automatic propeller-feathering device:

CAA engineering specialists reported what appeared to be a potential malfunction in the feathering mechanism, in the wiring, and ordered a "hot wire" in the bundle of wiring pulled out and carried in a separate protective conduit. They also ordered protective shields placed between the wiring and the engine exhaust augmentor tubes because of indication that exhaust heat had charred some of the wiring insulation. The airplane was approved for certification with this fix and went into airline operation.

Some time later, so the story goes, in another CAA region, an airline operator wanted to change propellers on this type of airplane. This was a maintenance, not engineering operation, as far as CAA was concerned. The record is not clear on why the airplane was insufficiently checked back to the original certification.

But in any case, the fact remains the airplane was returned to service with CAA maintenance approval and with its new propellers, but minus the protective shields and without the separation of the hot wire from the other wires. Technically, the airplane was returned to service to operate outside the terms of its original certification.

The hot wire has again been separated and the shielding replaced, but not before it had been operated for some time in the condition which the CAA engineers had considered a potential hazard. And during this operation there were reports of malfunctioning of the propeller-feathering device, which could have been attributed to this condition.

▶**Daily Reports**—One of the best keys to the co-ordination of engineering and maintenance in CAA as it affects the airlines is the handling of daily mechanical reports from the carriers. The CAA's Washington office receives daily telegraphic reports relayed through its maintenance agents stationed at airline bases, reporting any line equipment incident that might constitute a mechanical hazard.

These reports are furnished voluntarily by the airlines, and their chief usefulness is in catching potentially dangerous trends in equipment malfunctioning before the trouble becomes serious enough to cause an accident. The system has the effect of making all airline operations continuing service tests on equipment. It gives each airline and CAA a continuing daily check on how similar engines, propellers and other equipment and accessories are functioning in other airline operations.

The daily reports were instituted about three years ago in the Rentzel administration, and some industry people say they were "the best thing done for aviation safety" in his administration. But their effectiveness as a curb on potential accidents depends on how closely CAA engineering and CAA maintenance personnel work together.

Are CAA's maintenance and operations personnel technically qualified to catch the full significance of some of the engineering problems that come up in daily mechanical reports? And are they fully aware of the reasoning behind the engineering decisions in new aircraft certifications? Aviation industry critics say they are not; but unless they are, the separation of CAA maintenance and engineering is a serious mistake, both in the regions and in Washington.

▶**Red Tape**—"There is enough CAA red tape," one industry engineer asserts, "without putting in this artificial separation between maintenance and engineering. It doesn't do any good, and can well be harmful."

French Builders Pool Transport Efforts

(McGraw-Hill World News)

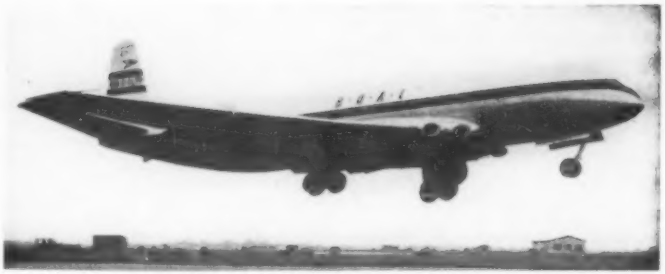
Paris—Four of the biggest French aircraft builders have acted to speed up development of new transport planes, especially jets.

Two of the big nationalized companies—Societe Nationale de Constructions Aeronautiques du Sud-Ouest (SNCASO) and Societe Nationale de Constructions Aeronautiques du Sud-Est (SNCASE)—have signed an agreement to pool their efforts and to a certain extent their resources in personnel and facilities for design of new commercial aircraft.

The other national company—Societe Nationale de Constructions Aeronautiques du Nord (SNCAN)—concluded a similar agreement with the private builder, Louis Breguet. Both agreements provide for full exchange of information on all construction and design to date and for close cooperation in new design development.

▶**Team Knowledge**—One member of each of the two teams is a successful builder of commercial two-engine transports, the other of four-engine transports. The two-engine SO 30P Bretagne and the four-engine Breguet 76 Deux Ponts already are in service. SNCASE's four-engine SE 161 Languedoc is in service and the SE 2010 Armagnac is coming off the production line. SNCAN's Nord 2051 two-engine transports are about to go into production.

Only SNCASO has yet built a jet transport—its SO 30 Nene.



DH Comet (G-ALYP) tucks its wheels up as it takes off from London Airport May 2 to inaugurate commercial jet airline service to Johannesburg.

New Patterns

- **First Atlantic aircoaches arrive as Comet leaves.**
- **British think U. S. unduly cautious on jet carriers.**

By William Kroger

London Airport—A new pattern for future air transportation was traced here within 24 hr. by two completely dissimilar airplanes on two dissimilar flights. But there is a connection between the landing of the first ocean coach plane from the U. S. and the take-off of the first jet transport commercial flight—and that connection should give U. S. airline management some uneasy moments, if not years.

Late in the evening of May 1, a TWA Constellation, Star of California, landed here with 59 passengers. Mid-afternoon of the next day, British Overseas Airways Corp. Comet G-ALYP took off for Johannesburg, South Africa, with 36 commercial passengers, the first ever to ride in a jet transport.

▶**Coach Flight**—The connection between the two flights is more than the fact that both used the same airport. The TWA coach Connie was about as fast as a first class Connie. First class service is more luxurious, but the coach passengers were comfortable enough, in view of the one-way fare saving of $125. The food is the same on both planes, but its cost is included in the first class fare.

But 8-10 hr. continuously in the air is just as boring first class as it is in a tourist plane.

There is a growing feeling that first class air service in the future will have to be the fastest service. That means jet transports. The fact remains that for more than a week now BOAC has had the world's only jet transport service.

▶**Three Comets**—Three Comets are in service, with nine to be in use before the end of summer. Traffic volume on the London-Johannesburg route well fits Comet capacity. There is no publicized intention now to use the present Comets over the Atlantic, but future Avon Comets will be able to make that hop.

Assertions in the U. S. that the Comet means little, that the jet transport era begins only when orders are placed in the hundreds, are greeted here as whistling in the wind, and the British may be right. U. S. airlines seem to want a longer range plane than the Comet, and feel a three to four year waiting period to get it is worthwhile. It is pointed out here, however, that the Comet is not the end to British jet transport development. In several years the British not only will have a longer range jet but also several years' experience in the operation of jet transports.

▶**No Ceremony**—It's easy to be skeptical of British jet transport progress when in the States; an observer here for the first time gets a different feeling, heightened, perhaps, by British refusal to make a show of the accomplishment.

Comet Flight

When the Comet, first jet airliner in scheduled service, took off from London Airport May 2 on its inaugural flight to Johannesburg, South Africa, it carried 36 passengers, crew of six and 30 bags of mail.

The Comet completed the 6,724-mi. flight in 17 hr. 16 min. flying time, 23 hr. 38 min. elapsed time. Nearest comparable piston-engine service between the two points, using Handley Page Hermes, is 27.55 hr. flying time, 32 hr. 15 min. elapsed time.

The Comet will fly the route once weekly until June 1, then three times weekly. Fare is $490 one way, $822 roundtrip.

No ceremonies marked the Comet departure. The only evidence it was not just another BOAC flight was a placard on the side of the bus taking passengers to the plane, reading: "World's first jet transport service, London-Johannesburg, May 2, 1952."

Throughout the flight the Comet was close to schedule. It landed at Johannesburg 2 min. ahead of the scheduled 23 hr. 40 min. Ordinary BOAC time for the trip is 32 hr. 15 min.

While the importance of the first jet service cannot be underrated, it should not overshadow the start of ocean coach. Coach services from here to the States are booked 80-90% for months ahead.

▶**First Flights**—First off on May 1 was the TWA Constellation, Star of California, carrying 59 passengers, which landed at London Airport that evening. PAA made two flights that day, the first with 87 aboard. El Al Israel Airlines carried 59. BOAC's tourist flight got off from London carrying 58. Sabena Belgian Airlines left Brussels with 60 aboard. KLM Royal Dutch Airlines carried 57 eastbound and 41 westbound. SAS Scandinavian Airlines System departed from Stockholm with 40. TCA took off from Montreal with 40 passengers. Air France left Paris with 59. Swissair started tourist operations on May 2, carrying 50 passengers from Zurich. LAI Italian Airlines departed from New York May 3 with 45 passengers.

Eastbound, the carriers generally report they are booked nearly 100% through July, with BOAC reporting fairly solid bookings through October.

And that kind of traffic, by fattening the airlines, might hasten the jet day.

On May 1, the first day coach service was available under regulations of the International Air Transport Assn., planes of several lines and nationalities were in the air over the Atlantic. And the character of the passengers was much the same as on the Star of California—mothers and children to visit servicemen husbands overseas, native-born English and Irish visiting relatives for the first time in years, vacationers, businessmen. An estimated third of the passengers not only never had flown the Atlantic before but never had flown before.

▶**Service Good**—Many of these people wanted to fly but never before could afford it. One important thing about the new coach service is that it closely parallels luxury service. The food is good. Seats are only a trifle narrower than first class and are deep and reclining. Three are on the right side of the aisle, two on the left. Some occupants of the middle seat said they slept all right; others said they were cramped. On the whole, there were few complaints. And much was said in appreciation of the new service.

Despite its initial success, coach service faces a variety of new headaches.

▶**Customs Problem**—Perhaps one of the biggest is the customs and immigration facilities at New York International Airport. Fifty-nine passengers arriving here (London) on the first TWA coach cleared customs in 35 min., but observers familiar with the corresponding arrangements at Idlewild are brooding over what happens there when three or four coach flights land within an hour with nearly 200 passengers. Visitors to the U.S. get their first impression from customs and immigration officials who are not noted for their dispatch and not always for civility.

Transportation to and from airports also enters consideration. Transportation here is furnished by the airline, but that may not be economically possible in the future with the volume ocean coach promises (British European Airways, starting London-Paris coach in the fall, thinks it will have to discontinue free transportation to and from airports). These matters of the ground-handling of passengers are easily brushed off when confined to Americans and British speaking a common tongue (with variations), but it gets grim to a person with a foreign language.

▶**Future Service**—Overshadowing all those details is the matter of what kind of service in the future will constitute first class. Sooner or later the airlines will have to face the question of what constitutes luxury. It seems to boil down to two alternatives: extremely low density, perhaps even with compartments and very much higher surcharge than today's $25 or so on blue ribbon TWA, Pan American Airways or Air France flights; or reasonable density and very high speed.

That again focuses attention on the Comet. The return flight of the Comet from Johannesburg was without incident. The jet transport landed seven minutes ahead of schedule.

It will be interesting to see whether other BOAC services to South Africa suffer because of the Comet availability. It will be even more interesting to see what happens when BOAC puts the Comet on its New York-West Indies run in December. That will give U.S. passengers their first chance for a direct comparison between jet and piston planes. The feeling here is that BOAC definitely will start such Comet service.

Civil Aeronautics Administration is dragging its feet on certification of the Comet, annoying the British exceedingly, but opinion here is that when BOAC is ready to operate the Comet from New York, CAA will give its okay.

Rheem Stock Deals Reported by SEC

Sale of 21,000 common shares of Rheem Mfg. Co. stock by D. L. Rheem, officer, leaving a total holding of 79,000 shares, is reported in the latest Securities and Exchange Commission report. Also reported: sale of 4,000 common shares by R. S. Rheem, officer, leaving a total holding of 54,028 shares.

Other transactions by aviation officials which have been reported recently, are:

● **Air Associates Inc.**—Rudolph F. Gagg, officer, purchase of 5,650 common shares, making total holding of 11,400 shares.

● **Airfleets, Inc.**—George Lusk, officer, purchase of 350 common shares, making total holding of 357 shares.

● **Alaska Airlines, Inc.**—Richard L. Hamack, officer, purchase of 5 common shares, total holding.

● **American Airlines, Inc.**—L. G. Fritz, officer, sale of 200 common shares, total holding; Melvin D. Miller, officer, exercise of option to purchase 1,000 common shares, making total holding of 3,100 shares.

● **Capital Airlines, Inc.**—J. H. Carmichael, officer, sale of 1,000 common shares, leaving total holding of 4,637 shares; Raymond G. Lochiel, officer, exercise of rights to purchase 100 common shares, making total holding of 2,915 shares; James R. Stockton, director, purchase of 100 common shares, and conversion of 4% conv. income debentures to 450 common shares, making total holding of 550 shares.

● **Consolidated Vultee Aircraft Corp.**—V. C. Schlorlemmer, officer, sale of 300 common shares, leaving total holding of 1,500 shares.

● **Curtiss-Wright Corp.**—Roy T. Hurley, officer, purchase of 1,000 common shares, making total holding of 2,000 shares; Francis R. O'Leary, officer, purchase of 100 common shares, total holding.

● **Douglas Aircraft Co., Inc.**—Neil Petree, director, sale of 100 class A common shares, leaving total holding of 100 shares.

● **Eastern Air Lines, Inc.**—Stuyvesant Peabody, Jr., director, purchase of 600 common shares, making total holding of 1,500 shares, purchase of 40 common shares in trusts, making total holding of 60 shares.

● **Fairchild Engine and Airplane Corp.**—Richard S. Boutelle, officer, purchase of 300 common shares, making total holding of 800 shares.

● **Northwest Airlines, Inc.**—Morton H. Fry, director, purchase of 100 common shares, total holding.

● **Pan American World Airways, Inc.**—H. M. Bixby, officer, purchase of 500 common shares, making total holding of 8,000; R. G. Ferguson, officer, sale of 100 common shares, leaving total holding of 504 shares; J. Preston Morris, officer, sale of 35 common shares, leaving total holding of 1,108 shares.

● **Piper Aircraft Corp.**—Walter C. Jamouneau, officer, purchase of 100 common shares, total holding.

● **Raytheon Mfg. Co.**—Charles F. Adams, Jr., officer, exercise of rights to purchase 1,500 common shares, making total holding of 7,500 shares; Wallace L. Gifford, officer, exercise of rights to purchase 25 common shares, making total holding of 123 shares; Paul F. Hannah, officer, exercise of rights to purchase 43 common shares, making total holding of 213 shares; N. B. Krim, officer, exercise of rights to purchase 55 common shares, making total holding of 300 shares, and Stanley P. Lovell, director, exercise of rights to purchase 125 common shares, making total holding of 625 shares.

● **Western Air Lines, Inc.**—I. W. Burnham II, director, sale of 200 capital shares, leaving total holding of 300 shares, sale of 6,000 capital shares held in partnership, leaving total holding of 4,000 shares.

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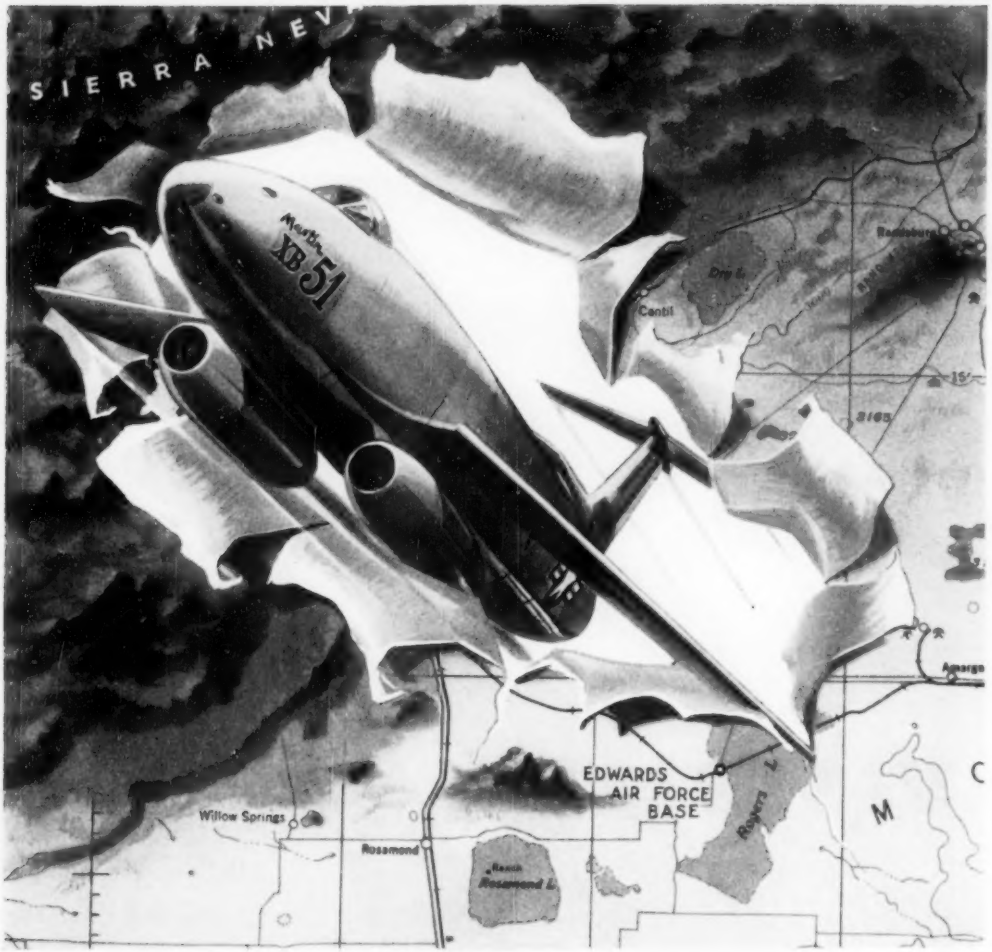

Changing the Face of Time and Space

Scene of the first supersonic flight, Edwards Air Force Base at Muroc, Cal., has become the primary test center for the United States' near-sonic and supersonic military aircraft.

Today, the desert air over Muroc Dry Lake is alive with the shrieks of high-speed aircraft as U. S. air research widens the crack in the sonic barrier. Operated by the U.S.A.F.'s Air Research and Development Command for all our military services, the test center's primary function is the exploitation of aircraft speed in terms of military missions . . . developing high-speed bombing techniques, for example!

One of its latest arrivals is the Air Force's Martin XB-51 developmental tactical bomber, fresh from Phase I and Phase II flight tests. Valuable experimental data already accumulated in these flights . . . plus findings still to come from Muroc flight testing . . . will help guide future research and development growing from the super-swift, three-jet, T-tailed Martin plane itself! THE GLENN L. MARTIN COMPANY, Baltimore 3, Md.

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Copter Group Plans Two-Day Air Show

A two-day helicopter air show at Bolling AFB and presentation of 15 papers on various aspects of rotary-wing craft will highlight the eighth annual forum of the American Helicopter Society in Washington, D. C., May 15-18.

Flight activities Saturday, May 17, will include Marine assault helicopter maneuvers, air rescue work by Air Force copters, newest Navy models including those with automatic pilots and Army observation evacuation and liaison missions. Sunday, May 18 a static display of military copters will be shown at Bolling AFB.

Bartram Kelley, Bell Aircraft Helicopter division chief engineer and president of AHS, will preside at the forum sessions in the Hotel Washington, May 15-16. Besides military and technical reports, other papers will include discussion of New York metropolitan helicopter service by Jack Rothman, New York Airways, and a review of British helicopter developments by A. McClements, technical editor, Helicopter Association of Great Britain.

Four Airlines List Top 1951 Salaries

Airline executives' incomes reported to CAB for 1951 show:

- Sigmund Janas, Sr., Colonial Airlines president until last Sept. drew a full year's salary of $13,000, compared with $18,000 the year before.
- Alfons Landa, Colonial president starting in Sept., drew $6,533 salary.
- C. E. Woolman, Delta Air Lines president, received a $30,000 salary in 1951, compared with $24,500 the year before.
- G. T. Baker, National Airlines president, received a salary of $30,000 plus bonuses of $51,400, compared with $30,000 and $6,511 in 1950.
- Croil Hunter, president of Northwest Airlines, drew a salary of $45,750, compared with $45,000 the year before.

Details, including present stock holdings of all executives of Colonial, Delta, National and Northwest:

Colonial Airlines, Inc.—Sigmund Janas, president and director, salary $13,000*, and 26,022 common shares ($18,000 and 26,922 shares); Edward S. Ridley, vice president, salary $5,599 and no stock ($11,999 and no stock); James F. Gormley, treasurer, salary $12,499 and no stock ($11,999 and no stock); Warren S. Cooper, secretary, salary $6,520 and no stock ($8,625 and 139 common shares); Branch T. Dykes, director and vice president-operations, salary $16,000 and 500 common shares ($15,000 and 500 common shares); Sigmund Janas, Jr., vice president-traffic, salary $11,999 and no stock ($11,999 and no stock); Alfred M. Hudson, vice president-advertising, salary $11,999 and bonus of $1,000, no stock ($11,999 and 800 common shares); L. Orville Cameron, vice president-secretary, salary $7,583, no stock (no 1950 report); Alfons B. Landa, president and director, salary $6,533 and 1,300 common shares**; Robert H. Herrnstein, vice president and controller, salary $7,604 and no stock**; Norman B. MacDonald, assistant treasurer, salary $5,872 and no stock**; Thomas J. Dunnion, chief accounting officer, salary $15,000 and 100 common shares**; John J. Murphy, chairman executive committee and director, salary $3,500 and $150 directors fee, no stock**; Stanley Meyer, director, salary $3,000, $150 directors fee, and no stock (salary $7,500 $500 directors fee and 100 common shares); Karl H. Bissell, director, no salary, $50 directors fee, no stock $550 directors fee and 3,000 common shares); Francis Hartley, Jr., director, $250 directors fee and no stock ($550 directors fee and 12,404 common shares); A. Charles Schwartz, director, $950 directors fee and no stock**; Joseph J. Shields, $400 directors fee and 2,000 common shares**. * Full 1951 salary paid. ** No 1950 reports on these men.

Delta Air Lines, Inc.—C. E. Woolman, president, general manager and director, salary $30,000, bonus $38 and 32,451 common shares (salary $24,500); C. E. Faulk, chairman of the board, salary $8,000 and 8,836 common shares (salary $12,000); Charles H. Dolson, vice president-operations, salary $20,000 bonus $38 and 1,300 common shares (salary $16,333); Laigh C. Parker, vice president-traffic and director, salary $21,000, bonus $38 and 1,500 common shares (salary $18,250); L. B. Judd, comptroller, assistant secretary and director, salary $13,542, bonus $38 and 2,005 common shares (salary $10,941); Travis Oliver, treasurer, and director salary $1,200 and 1,895 common shares (salary $1,200); C. H. McHenry, secretary and director, salary $1,200 and 1,500 common shares (salary $1,200); Catherine Fitzgerald, assistant treasurer, salary $4,800, bonus $38 and 2,300 common shares (salary $4,250); and the following directors: D. Y. Smith, 1,050 common shares*; Richard W. Freeman, 7,000 common shares*; Edward H. Gerry, 1,400 common shares*; Winship Nunnaly, 10,000 common shares*; R. J. Reynolds, 112,900 common shares*, and R. W. Courts, 50 common shares*. * No 1950 reports on directors.

National Airlines, Inc.—G. T. Baker, president and director, salary $30,000, bonus $51,400 and 168,464 common shares ($30,000, $6,511 and 168,532 common shares); J. L. Morris, vice president, salary $12,000, bonus $20,560 and 10 common shares ($12,000, $2,604 and 10 common shares); J. D. Crane, vice president-engineering, salary $12,000, bonus $20,560 and 238 common shares ($12,000, $2,604 and 238 common shares); E. J. Kershaw, vice president-operations and maintenance, salary $16,000, bonus $27,413 and 600 common shares ($16,000, $3,472 and 400 common shares); Walter Sternberg, vice president-sales, salary $20,000, bonus $30,634 and 100 common shares ($17,916, $3,498 and 100 common shares); R. E. Wieland, vice president-foreign operations, and director, salary $9,000, bonus $15,420 and 300 common shares ($9,000, $1,953 and 100 common shares); J. M. Rosenthal, vice president-industrial relations, salary $12,000, bonus $20,560 and 500 common shares ($12,000, $2,604 and 100 common shares); R. P. Foreman, secretary and director, salary $12,000, bonus $20,560 and 100 common shares ($12,000, $2,604 and 100 common shares); J. C. Brawner, treasurer and director, salary $12,000, bonus of $20,560 and 60 common shares ($12,000, $2,604 and 60 common shares); W. F. Johnston, assistant secretary-treasurer, salary $8,400, bonus $11,553 and 100 common shares ($7,050, $1,432 and 100 common shares); and the following directors: G. W. Gibbs, Jr., 60 common shares (60 common shares); Paul R. Scott, 3,000 common shares (3,000 common shares); Joseph N. Jones, 10,200 common shares (10,200 shares); J. A. Waterman 506 common shares (506 shares); J. A. Thomas 3,000 common shares (3,000 shares); Alfred L. McCarthy, 1,750 common shares (1,750 shares) and W. E. Jacobs, Jr., 1,980 common shares (1,980 shares).

Northwest Airlines, Inc.—Croil Hunter,

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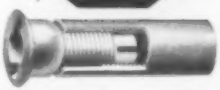
LOK-SKRU
THE BLIND ANCHOR NUT OR/RIVET
ONE MAN INSTALLATION IN SECONDS



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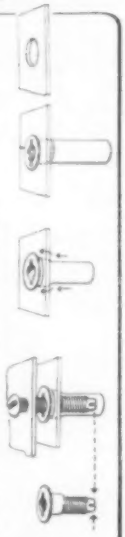

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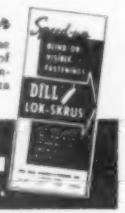

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president, general manager and director, salary $45,750 and 4,050 common shares ($45,000 and 4,050 shares); Malcolm Mackay, assistant to general manager, executive vice president and director, salary $20,000, $80 directors fee, 1,200 common shares and 3,400 preferred shares (no salary reported, $200 fee, 1,000 common and 3,200 preferred shares); Linus C. Glotzbach, vice president and assistant to president, salary $18,000 and 5 common shares ($17,062 and 5 common shares); E. I. Whyatt, vice president, comptroller and director, salary $21,000, 5 common shares and 1,974 preferred shares ($20,000, 5 common shares, and 1,974 preferred); A. E. Floan, vice president, secretary and director, salary $17,750 and 200 common shares ($17,000 and 4,050 common shares); K. R. Ferguson, vice president-operations and director, salary $3,667 and 150 preferred shares ($24,000 and 150 preferred shares); Frank C. Judd, vice president-operations, salary $19,224 and 5 common shares ($15,000 and 5 common shares); Amos Culbert, vice president-sales, salary $18,500 and 100 preferred shares ($15,000 and no stock); L. S. Holstad, treasurer, salary $15,750 and 305 common shares ($15,000 and 305 common shares); D. J. King, vice president-Orient, salary $17,590 and 1,000 preferred shares ($17,024 and no stock); C. L. Stewart, assistant secretary, salary $6,900 and no stock ($6,523 and no stock); William J. Elden, assistant treasurer, salary $11,100 and 4 common shares ($10,800 and 5 common shares); A. D. Piepgras, assistant treasurer, salary $12,382 and 300 common shares ($11,878 and no stock); and the following directors: William T. Gardner, directors fee $140 and no stock ($140 and 500 common shares); Robert M. Hardy, directors fee $180, 575 common and 1,000 preferred shares ($120, 575 common shares); Joseph T. Johnson, fee $200 and no stock ($160 and 900 common shares); Dr. Charles Mayo, fee $140 and no stock ($200 and 100 common shares), Alonzo Petteys, fee $220 and 1,300 preferred shares ($180 and 1,100 preferred); William Stern, fee $180 and 1,500 common shares ($200 and 1,500 common shares); and Edwin White, fee $220, 100 common shares, and 200 preferred shares ($220, 100 common and 200 preferred).

AA Convair Crash Cause Is Unknown

Cause of the fatal crash of American Airlines Convair at Elizabeth, N. J., Jan. 22 probably will remain a mystery, CAB has reported officially.

The plane went out of control in the last part of a normal instrument approach to Newark Airport. It suddenly plunged into an apartment building at a steep angle, killing all 23 aboard and seven Elizabeth residents.

CAB accident investigators report:

- **Up to the last moments,** the flight appeared normal.
- **Carburetor icing** may have caused power surging, evidence indicates.
- **An abrupt turn** 40 deg. right and rapid settling are indicated by witness reports and final position of the plane wreckage.

Stall is not specifically mentioned as a cause possibility. However, power loss with wheels and flaps down "would result in the loss of air speed to a marginal value," the analysis says. "This condition, together with the effect of the near maximum gross weight and high wing loading could have precipitated a high settling rate," the report adds.

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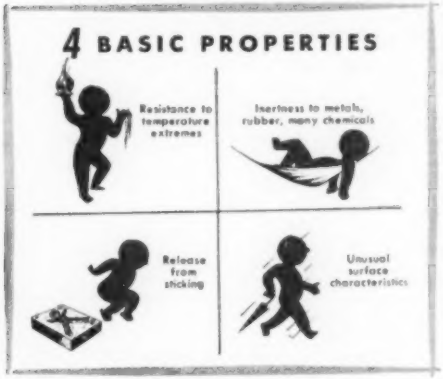

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GENERAL ELECTRIC

131-3

MID-CONTINENT OKAYS JANITROL FOR ENTIRE CONVAIR FLEET

Now is a good time to install Janitrol heating equipment in Convairs, and count on the same performance—"equal to all occasions"—that Mid-Continent obtained last winter. Capt. L. Homer Mouden, one of Mid-Continent's pilots, wrote in his log book: "It is really a comfort and a joy to have heat in the cockpit. This is the best arrangement of our CV-240 fleet . . . and thanks from the pilots." "Thanks to you, Mid-Continent, for this heart-warming testimonial . . . Your nearest Janitrol representative can furnish prompt assistance in planning and making this installation.

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December 21, 1950

Surface Combustion Corporation
1200 Dorr Street
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At the time we placed our Convair aircraft in service last Spring, we recognized the problem of inadequate cockpit heat and the need for heating the cabins on the ground; therefore, a decision was made to install "Janitrols", as we considered such an installation to be the most logical solution to our problem.

Since completing the installations in our fleet of Convairs, we have operated in temperatures far below zero, both on the ground and in the air, and have found the Janitrols equal to all occasions. Our Convair cockpits are safe and cabins may be heated to a comfortable temperature before boarding passengers, regardless of outside air temperature.

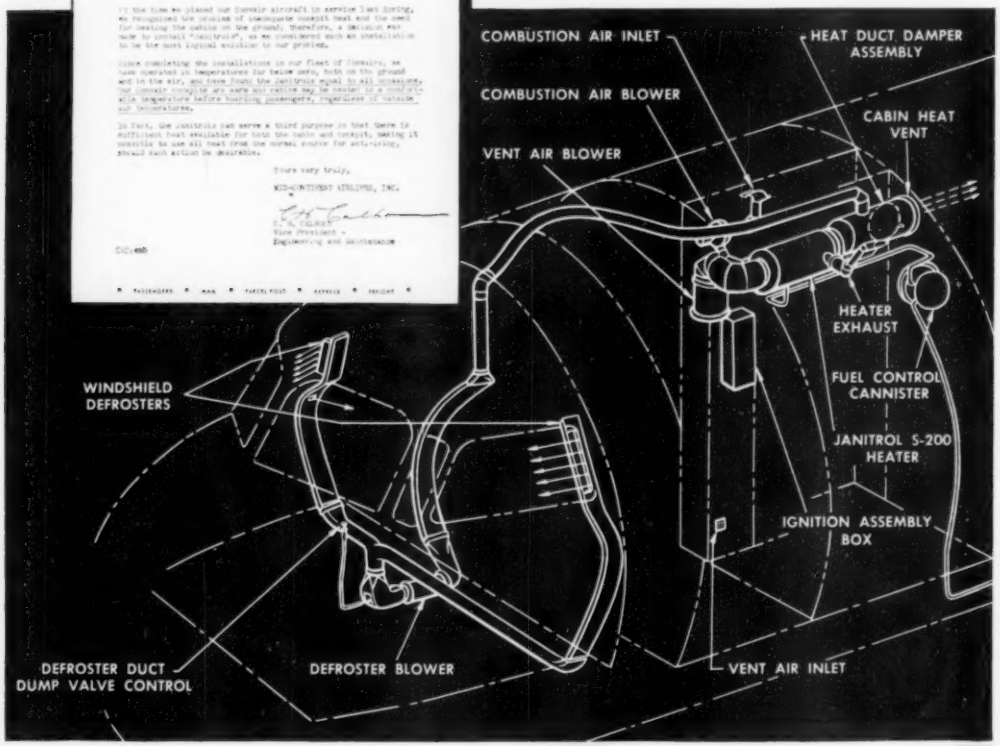
In fact, the Janitrols can serve a third purpose in that there is sufficient heat available for both the cabin and cockpit, making it possible to use all heat from the normal source for anti-icing, should such action be desirable.

Yours very truly,

MID-CONTINENT AIRLINES, INC.

C. H. Calkins
Vice President -
Engineering and Maintenance

CHC:mb



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Lessons Taught by Turboprop Viscount

- **BEA, Vickers have over 2,200 hr. on Darts.**
- **This includes more than 700 on DC-3 Dakotas.**

By David A. Anderton

The Vickers Viscount series, first turboprop-powered civil aircraft in the world, has passed another milestone on the five-year road between experimental flight and regularly scheduled service.

Successful completion of tropical flight trials now lies behind the Viscount 700, pre-production prototype of the series. Ahead of it are about 200 hours of anticipated proving flights on the routes of British European Airways this coming summer. On Oct. 1, says BEA, the first production Viscount 701 will be delivered; and by spring, 1953, BEA's fleet of Viscounts—called the Discovery class and named after famous explorers—is expected to be in regular service.

►**High Time**—Vickers and BEA pilots have racked up over 1,500 hr. of flight time in the two prototype Viscounts. That much flying time has taught a large number of lessons, and it is worth having a good look at the textbook of flight experiences and particularly at the techniques and technicalities of engine and airframe operations.

The first experimental Viscount, Type 630, has been on flight status since July 16, 1948, and has over 1,000 hr. to its credit. The second prototype, Type 700, has the remainder.

(In sharp contrast, flight experience with America's only near-counterpart—the Allison Turboliner—is about one-tenth the Viscount time.)

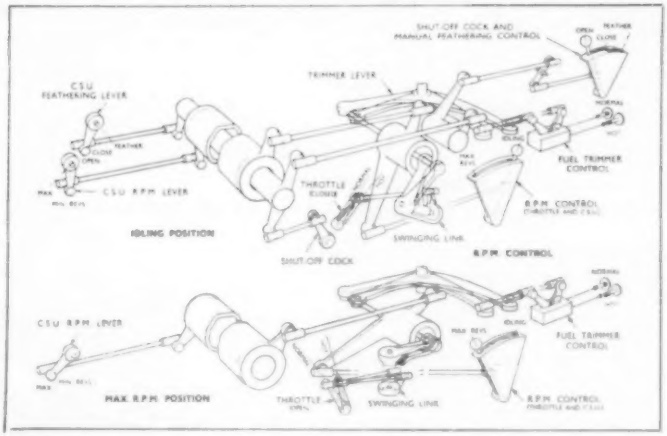
To get some idea of the Viscount size, think of the Martin 4-0-4 or the Convair 240, closest geometrically to the British job. Wingspan of the Viscount is 94 ft.; its fuselage is 81 ft. 2 in. long. Production versions will have gross weight pegged at 52,500 lb., roughly 25% more than the 4-0-4 and 240 gross weights.

The Viscount cabin is pressurized to an inside altitude of 8,000 ft. at an aircraft altitude of 25,000 ft. Seating varies from 40 to 48 on long-range routes, and 53 passengers can be carried over short distances.

Four Rolls-Royce Dart 505 R.Da3 turboprop engines power the Viscount. Each puts out 1,530 ehp. at sea level.

(A more complete description of the Viscount series was given in AVIATION WEEK Nov. 6, 1950, p. 21 ff.)

►**Dart Engines**—The Dart was de-



DART turboprop engine control linkage: Idling (upper), full power (lower).

signed specifically as a civil engine and primarily for the Viscount. During the early meditations of the Brabazon Committee over postwar British civil types, the Dart was rated at about 800 hp. By the time designs were begun for the aircraft classed with the Viscount, the engines were giving 1,000 hp. Both Armstrong Whitworth and Vickers-Armstrongs started work on prototypes (Apollo and Viscount respectively) with BEA's engineering staff more intimately concerned with the latter. By that time, the Dart was putting out 1,250 hp.

By late 1947 it was clear that the Dart could be further developed. Work continued on the first Type 630 Viscount with the 1,250-hp. engines, and a second Type 630 was converted to the prototype 700. The Darts for the Type 700 were to be rated at 1,400 shaft hp, plus some jet thrust, giving the ehp. total of 1,530.

The Dart installation is probably the most beautiful to be seen in contemporary airplanes. The sleek, slim nacelles cantilever forward from the wing, fair into concentric air intakes and change into long spinners for the 10-ft.-diameter four-blade Rotol props.

► **Accessories**—Accessory gearboxes, shaft-driven from the compressor through a spur-gear train, are mounted below large access panels in each nacelle. All four gearboxes drive a common installation of a 6-kw. Rotax d. c. generator, a 7½-kva. Rotax alternator (for prop de-icing) and a tachometer generator. In addition, the gearboxes in No. 2, 3 and 4 nacelles drive Type 15 Marshall cabin blowers, and in No. 2 and 3 nacelle also drive Lockheed Mk. 7 hydraulic pumps.

About 3½ gal. of lubricating oil and 1 gal. of prop feathering oil are carried in a circular tank integral with the engine. Gear pumps lubricate the main bearings at a rate of 460 gph. and a pressure of 30 psi. Oil consumption is extremely low; on the tropical trials in Africa, average value was one-eighth of a pint per engine per hour.

► **Fuel System**—Crashproof bag tanks carry the normal fuel load of 2,065 gal. in inner and outer wing panels. These bags are pressurized to 0.5 psi., first by engine compressor bleed and, after speed has been attained, by forward-facing vents. This pressurizing prevents collapsing of the bags as fuel level drops, and means accurate measurement of the remaining fuel.

Left and right wing tanks have crossfeed pipe and cock connections; engines can be fed from either wing panel. Both gravity refueling from above and pressure refueling from below are possible with the Viscount.

Fuel booster pumps—in the base of each tank bank—feed fuel at 5 to 10 psi. into twin non-return valves and then to the engine master cocks. These pumps can be removed through access panels in the wing lower skin without draining the tanks first.

From master cocks the fuel goes through flowmeters and low-pressure filters to high-pressure engine-driven fuel pumps.

► **Fuel Control**—A Lucas flow-control unit meters and governs the fuel flow from engine-driven pump to burner nozzles. The unit comprises filter, barometric-pressure control valve and shutoff cock. Some indication of the governing job comes from the range of fuel pressures required: at idle, 40 psi. is about normal, and at takeoff, 950 psi. is called for.

Fuel from the aircraft booster pump goes through the barometric pressure chamber and then to the engine pump intake. From this fuel goes through throttle and pressure control valves to the burners.

Fuel rate and pressure are controlled by varying the length of the engine-driven pump stroke, which is in turn varied by a servo-controlled piston operated on pressure drop across the throttle.

High-pressure shutoff is linked to the prop feathering system; when a prop is feathered, the engine is isolated

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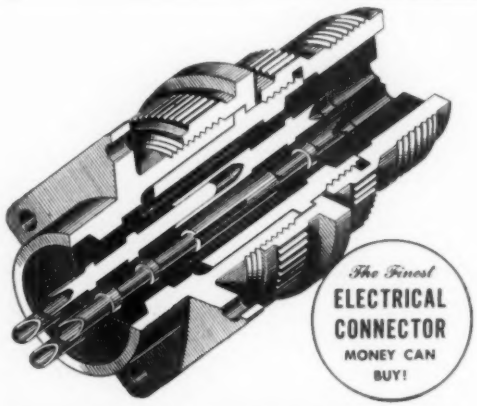

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The American Brass Company, Waterbury, Conn., reports

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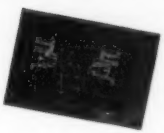

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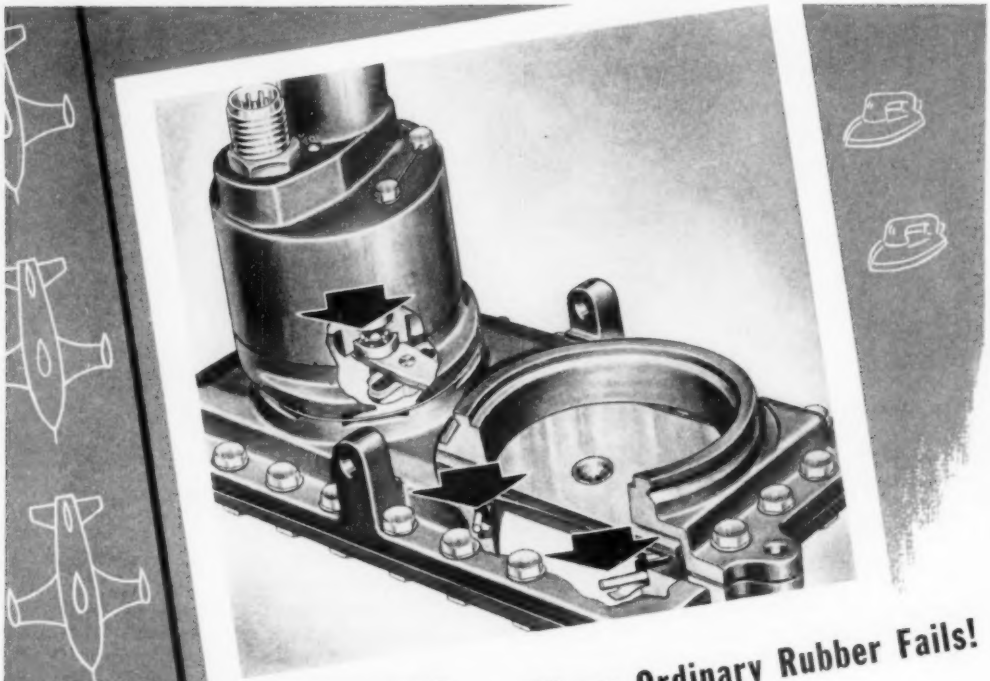

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VISCOUNT 700 in colors of British European Airways is pre-production prototype of entire series. Ventral scoop is for cabin comfortization system.

from the aircraft's fuel system.

Variations in ground temperature are compensated by a variable-datum linkage in the throttle control. Correct setting can be made before takeoff, afterwards correct air-fuel ratio is maintained by the control unit.

Water-methanol injection is used to maintain takeoff power above the ICAN temperature conditions.

► **Rotol Props**—Four-blade, 10-ft.-diameter Rotol props have been specified for early production aircraft. These props are hydraulically operated on engine oil supply and boosted for feathering by a special pump and supply.

Blade angle range is from 4 deg. for ground starts through 21 deg. for flight low pitch to almost 86 deg. fully feathered.

Microswitches on the landing gear control the ground start position; unless the gear is compressed, that position cannot be obtained normally. There is a pilot-controlled override switch in the cockpit, which is moved to the "in" position just before takeoff; this prevents the prop from moving into full low pitch in the case of engine power loss while the gear is still partially compressed. When the aircraft is off the ground, the switch is moved to the "out" position.

Automatic feathering operates under two conditions: Throttles positioned at cruise or above, and during a refused landing. In the former case, a switch in the torquemeter energizes the feathering circuits. In the latter, energizing takes place when the pilot moves throttles forward for power after refusing the landing.

► **Engine Controls**—Each engine is controlled by two levers, one being the throttle and the other a combined high-pressure fuel cock and prop feathering control.

The throttle controls the flow valve in the fuel unit and is also linked to the rpm. control governor in the constant-speed unit. The linkage guarantees correct ratio between rpm. and fuel flow.

Engine starting panel is mounted by the second pilot; it consists of a starter button and an engine selector switch. Adjacent to this are four fuel datum control switches which operate actuators connected directly to the fuel control unit linkage. Four indicators in the center instrument panel show relative positions of datum control actuators.

As part of the development program for engine installation, BEA decided to convert two Douglas DC-3 airplanes to turboprop power. These aircraft—called Dart Dakotas by the British—have been run in freight service for BEA a total time of over 700 engine flight hours.

As far as possible, the Viscount installation was duplicated on the Dart Dakotas. Cowling simulation was not possible, nor did the Dart Dakotas have pressurized cabins. The former was tolerated; the latter was simulated by throttling of the cabin blower.

► **Initial Flights**—After the prototype Viscount had flown for 281 hr., it was granted a limited certificate for operation without fare-paying passengers. The only aerodynamic change suggested by these trials was a change in stabilizer incidence. After that was done, handling characteristics were uniformly satisfactory.

The original ground pitch setting of 4 deg. was found to be too high because the props developed too much thrust when idling. By dropping this angle to 0 deg. the problem was licked.

There was criticism of the rate of power increase during refused landing overshoot procedure. Approach rpm. were governed to 6,000 (engine) and the prop blades were in correspondingly coarse pitch. When throttles were opened, the interconnection between throttle and prop controls called for lower pitch on the blades to accommodate the increase in rpm. This pitch reduction caused a momentary loss in thrust which resulted in aircraft deceleration. This changed quickly to acceleration as the pitch increased again to absorb the increased engine power.

► **Solution**—To solve this one, the requirement was that response rate should be equal to or better than that obtainable from a piston engine.

First step was to increase the ap-

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proach idling rpm. to 10,000; this made the approach blade setting much lower and power increase did not cause the thrust loss. As a secondary benefit, as soon as the airplane has touched down, the flight low-pitch stop is withdrawn to increase the configuration drag.

There was a further improvement by fitting microswitches into the landing flap circuit. These switches are operated by the throttles. Flaps are automatically lowered from an intermediate position to full deflection when throttles are closed, and are similarly raised if the throttles are later opened for overshot after refused landing.

▶**Engine Experience**—Both BEA and Vickers have learned much from the flying hours gathered by the Dakotas and Viscounts.

Special Diesel-electric starting equipment was developed by BEA for the Dakotas, but other than that, there has been no problem rising from ground runs of the engines. The entire ground operation is less complicated than that for piston engines, because of less controls to operate and simplified check procedures.

On the Viscount's European tours in early 1950, the average time from engine start to taxi start was 2½ min. Initial cockpit checks, starting procedure, pre-taxi and pre-takeoff checks took less than 4 min.

Taxiing technique, says BEA, has proven to be little different from normal piston-engine practice. Engine rpm. is considerably higher, being about 75% of maximum continuous. The throttle is used less, in the interests of maintaining tailpipe temperature constant and thus increasing engine life. Instead the brakes are used more on the Dakotas; there should be no penalty with nosewheel steering on the Viscount.

Noise level in taxi is higher than piston-engined aircraft, and the compressor whine is particularly noticeable.

▶**Drawback**—Main disadvantage in ground runs is the high fuel consumption. For the Dart, the fuel burned is about the necessary operating data for by a piston engine of the same horsepower. From another viewpoint, ground running takes almost 70% of the normal engine cruise consumption.

Once airborne, the problems of either Viscount or Dart Dakotas are basically those of any civil transport. BEA does sound one note of discord in talking about the necessary operating data for the flying crew. Charts have been used for the Dart Dakotas, but BEA suggests that tables or even computers may be necessary.

During Viscount flight trials, best climb speed was found to be 156 knots (presumably indicated airspeed) with a corresponding initial rate of climb of 1,700 fpm. This gradually reduces to 500 fpm. at the cruise altitude of 20-23,000 ft.

Cruise flight is conducted at constant rpm. and indicated airspeed, and the plane is allowed to climb as weight decreases. This was considered to be the suitable compromise between economy and control simplicity. Letdown is on two engines at about 210 knots.

▶**Engine Maintenance**—After these flights, BEA reported "the remarkable serviceability given by the engines" and the "ease of airframe maintenance."

The only work necessary on the engines during these flight trials—not including routine maintenance—was the replacement of a single torch igniter.

Typical maintenance times for engine work are cited by Vickers as absolute minima. Complete powerplant change is 35 min.; a starter motor can be replaced in 15 min. and a feathering pump in 30. Examination of the turbine takes 10 min.

During BEA's trials of the Viscount, scheduled maintenance manhours amounted to 0.44 per flying hour. Unscheduled maintenance raised this figure to 0.48.

Scheduled maintenance during BEA's tours included 48 preflight, 22 daily and two 50-hour checks. Preflight inspections averaged 15 min.; daily inspections took about 1¼ hr. The 50-hr. checks required 5½ hr., and Vickers feels that this could be reduced with increased experience on the aircraft.

▶**Flight Data**—One of the important lessons of the BEA flights was that differences between pilots—in matters of skill and concentration—produced

(*Continued on page 35*)

GENERAL ELECTRIC'S WINGED MESSENGER

Hermes A1, one of a series of missiles under development for U. S. Army Ordnance by the General Electric Co., is shown before firing at White Sands Proving Ground, N. M. External shape of the A1 resembles that of German World War II anti-aircraft missile Wasserfall, a supersonic, rocket-propelled weapon. Apparent changes from German layout include clipped wings and extended rudders. Assuming Wasserfall dimensions were kept, A1 diameter is about 3 ft., overall length about 25 ft. Purpose of test flights is to determine basic data for tactical missile design.

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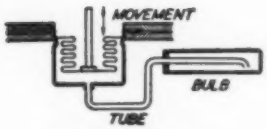

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Pratt & Whitney Aircraft Teams Up With Licensees To Speed Supply of Aircraft Engines

"TEAMING UP" with other industries to produce more aircraft engines is not a new concept at Pratt & Whitney. The idea of licensing outside manufacturers was pioneered and developed into a practical system right here during World War II. It worked so well that Pratt & Whitney and its licensees produced almost half of all the horsepower used by Allied combat planes.

And now—at no profit to itself—Pratt & Whitney Aircraft is again building up another team of licensees. In the interest of national defense, this company is sharing the fruits of its research and its hard-earned production knowledge with—

The Ford Motor Company. This company is now swinging into production on the Wasp Major piston engine, which powers the Convair B-36F bomber, the Douglas C-124, Boeing C-97 and Fairchild C-119 transports for the Air Force. Ford has also been licensed to build the big axial-flow J-57 Turbo-Wasp jet engine, which will power the Air Force's Boeing B-52 and Convair B-60 bombers as well as other combat craft still under security restrictions.

The Chrysler Corporation. The Dodge division has been licensed to produce the J-48 Turbo-Wasp jet engine and the DeSoto division will build afterburners, for this power plant. The J-48 powers the Navy's Grumman F9F-5 Panther and swept-wing F9F-6 Cougar fighters and the Air Force's all-weather interceptor, the Lockheed F94-C.

Nash-Kelvinator Corporation. Licensed to build the Double Wasp piston engine, which powers the Navy's North American AJ-1 Savage bomber, Grumman Guardian anti-submarine airplane and Vought Corsair fighter. This engine also is used in the Air Force's Convair T-29 and Beech T-36 transport trainers and the Chase C-123 and Douglas C-118A and R6D-1 transports, as well as in new large helicopters.

Canadian Pratt & Whitney Aircraft Ltd. This subsidiary of United Aircraft Corporation will build the 600 h.p. Wasp engine in a brand new plant now nearing completion at Longueuil, Quebec. The Wasp will power the de Havilland Otter transport and the Canadian-built T-6 trainer.

Supplementing Pratt & Whitney's own greatly expanded production, these outstanding companies will put their manufacturing know-how to work to produce the large quantity of Pratt & Whitney engines needed for the defense effort.

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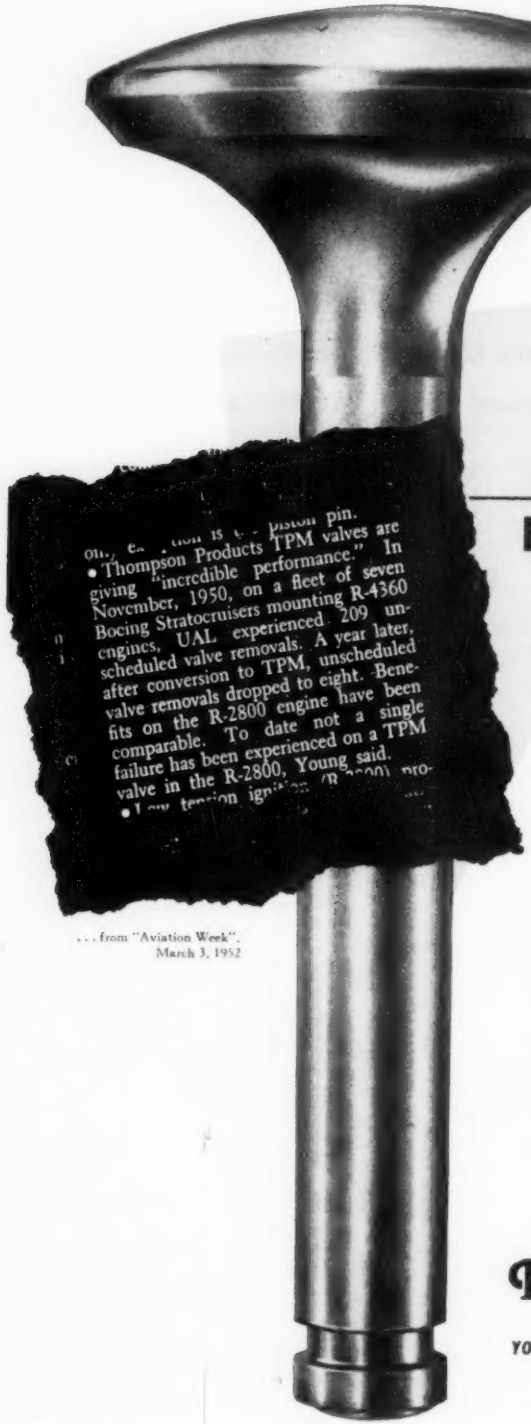


• Thompson Products TPM valves are giving "incredible performance." In November, 1950, on a fleet of seven Boeing Stratocruisers mounting R-4360 engines, UAL experienced 209 unscheduled valve removals. A year later, after conversion to TPM, unscheduled valve removals dropped to eight. Benefits on the R-2800 engine have been comparable. To date not a single failure has been experienced on a TPM valve in the R-2800, Young said.

. . . from "Aviation Week", March 3, 1952

UNITED AIR LINES

UNITED AIR LINES has this to say about THOMPSON TPM VALVES

Here's further proof that Thompson TPM valves are the greatest advance in aircraft valves in over 15 years.

TPM is the new valve material developed by Thompson to provide greater strength and greater corrosion resistance at high operating temperatures.

Another Thompson-developed alloy gives TPM valves harder wear surfaces on faces and heads. Peened stems provide harder surfaces to resist wear.

VALVE DIVISION

Thompson Products, Inc.

EUCLID, OHIO

YOU CAN COUNT ON THOMPSON FOR ENGINEERING LEADERSHIP

(Continued from page 30)

greater performance variations than if the same pilots had been flying piston-engined aircraft. Conclusion: Method of presenting performance data to pilots is of great importance.

But conversion of pilots to turboprop aircraft should take only about 12 to 15 hr., says Vickers, and this time would include night flying.

There were no particular difficulties in traffic, once the controllers appreciated the higher operating altitudes and letdown speeds. The Viscount flew the regular piston-engined aircraft patterns, and was not given preferential tr' .ment. But it was apparent that descent clearance had to be given well in advance of antitcipated letdown.

Normal meteorological forecasts for the 15,000 to 25,000 ft. belt were adequate. But it was found that upper wind direction and velocity forecasts were often inaccurate.

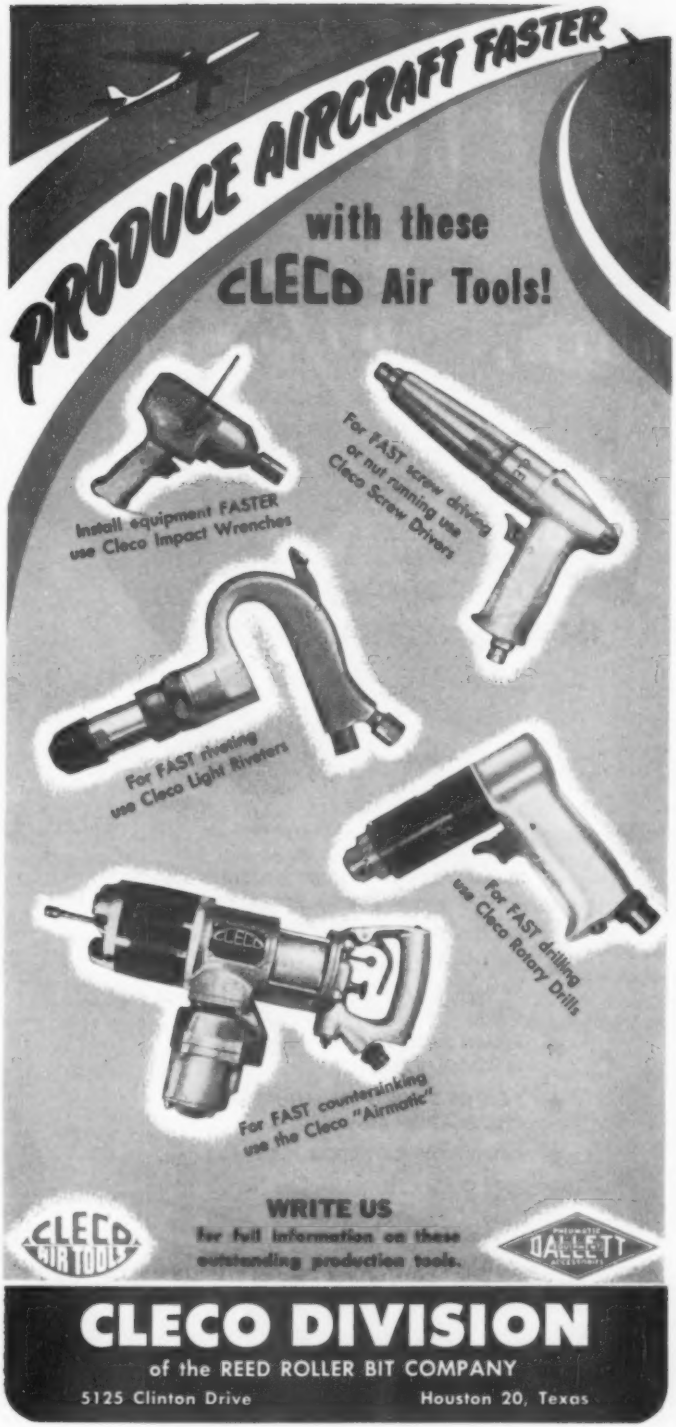
▶ **Hot and Cold**—Part of the required demonstrations before certification for passenger carrying are icing and tropical trials. The prototype 630 Viscount has been through both some time now, and has been cleared for light icing conditions on the engines, standard icing on the airframe and tropical operations.

As a result, the 630 received its full Certificate of Airworthiness on July 26, 1950.

The 700 has recently been through the mill of tropical tests. Ground temperatures varied from a low of 95F to a high of 102F during the trials. These were the results:

- **Takeoff climb in 4-engine operation** (Gross weight 50,000 lb., flaps down 20 deg., landing gear down, airspeed 105 kt.): Rate of climb—sea level, 1,480 fpm. at 97F; 10,000 ft.—1,000 fpm. at 54F.
- **Takeoff climb in 3-engine operation** (Conditions as above except for airspeed): Rate of climb—sea level, 680 fpm. at 102F; 10,000 ft.—360 fpm. at 50F.
- **Refused landing climb** (Gross weight 47,500 lb., 4-engine operation, flaps down 40 deg., landing gear down, airspeed 100 kt.): Rate of climb—sea level, 1,180 fpm. at 95F.
- **Preliminary approach climb** (Gross weight 47,500 lb., 3-engine operation, flaps down 30 deg., landing gear down, airspeed 100 kt.): Rate of climb—sea level, 580 fpm. at 99F.
- **Takeoff performance** (Air temperature 100F, engine cut at critical speed of 86 kt.): Distance to clear 50-ft. obstacle—1,470 yd.

▶ **Current Sales**—Vickers has stated that there are firm orders for 36 Viscounts at hand. Of these, 20 are for BEA, 12 for Air France and four for Aer Lingus. There is also the possibility that BEA may take more than 20; the figure men-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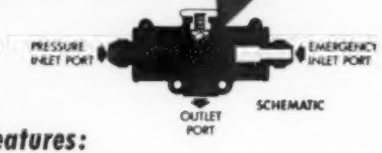
AN 3000 AND 1500 PSI HYDRAULIC SHUTTLE VALVES



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tioned in this connection is 28.

But even more than firm orders, eventual performance is the final payoff on any transport type. After October, a lot of airline operators are going to be watching BEA's balance sheet very carefully. Turboprop transports may rise or fall on those results.

Regent Produces Rocket 5-Placer

Production of the Rocket 400 five-place single-engine business plane has begun in the first unit of Regent Aircraft, Inc.'s factory in Pearland, Tex., 14 miles south of Houston.

Regent is pushing its pilot run of aircraft in order to achieve type certification of the new Model 400 and has plans for the plane to undergo military evaluation.

The firm has scheduled construction of a 6,000-sq. ft. plant adjacent to the present operation and is considering a conveyor type assembly line to permit production of five units daily. Initial employment is planned at approximately 100, is scheduled to go to 1,200 when the new building is in full production.

Model 400 is a development of Model 260 built early last year. The Rocket 400 has a 400-hp. Lycoming engine. It is all-metal with a retractable tricycle landing gear. At 14,000 ft., cruise speed is given as 250 mph. Dimensions are: span, 33.5 ft.; overall length, 28 ft.

Rocket 400's gross weight is 3,500 lb. Standard price is approximately $25,000.

Tin-Plated Glass to Fight Windshield Ice

A windshield designed for electrical-heat ice removal has been suggested by Britain's National Physical Laboratory as a result of experimentation with transparent metallic oxide films.

Tin, as one example, can be deposited evenly on glass by techniques already known in the industry. By heating the glass near the softening point, the tin oxidizes and becomes transparent. Finally the film is washed in water and dried, a step which increases its conductivity.

In practice, this film would be sandwiched between two layers of glass.

There is negligible reduction in visibility caused by the film. It has enough resistance to keep the surface of the glass hot enough to prevent icing or steaming over.

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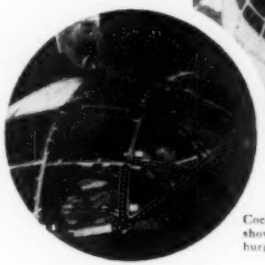
World's biggest bomber—the Convair B-36—relies on PITTSBURGH FLEXSEAL SAFETY GLASS

Six 3800-hp piston engines, plus four jet engines, power the Convair B-36, the world's largest bomber. The pilot's and bombardier's compartments are glazed with 85 separate pieces of Pittsburgh Flexseal Safety Glass.

Bombardier's compartment of the B-36 is glazed with optically-excellent Pittsburgh Flexseal.



Cockpit canopy of the B-36, showing curved panels of Pittsburgh Flexseal Safety Glass.

THE Convair B-36 is the Air Force's "Sunday punch"—the most powerful strategic aircraft in existence today. It holds records for the heaviest load of bombs dropped by one airplane, for the longest high-altitude mission.

The "eyes" of this mighty striking weapon—the pilot's and bombardier's compartments—are glazed with Pittsburgh Flexseal Safety Glass—85 separate pieces in each B-36, to be exact.

These laminated glass-and-plastic Flexseal panels are made to the exact thickness necessary to withstand the pressurized load without adding unnecessary weight. Slotted metal inserts provide extra strength, permit flush mounting and assure a smooth outer surface. Many of the panels involve compound curvatures which require additional precise tooling.

Furnishing Safety Glass and glazing techniques for the B-36 is typical of Pittsburgh's service to the aircraft industry. Manufacturers of all types of military and commercial aircraft take advantage of the research and production facilities, the competent engineering assistance and the complete line of Safety Glass available to them at Pittsburgh Plate Glass Co.

If you have a problem involving glass or glazing techniques, write to Pittsburgh Plate Glass Company, Room 2168-2 Grant Building, Pittsburgh 19, Pa.

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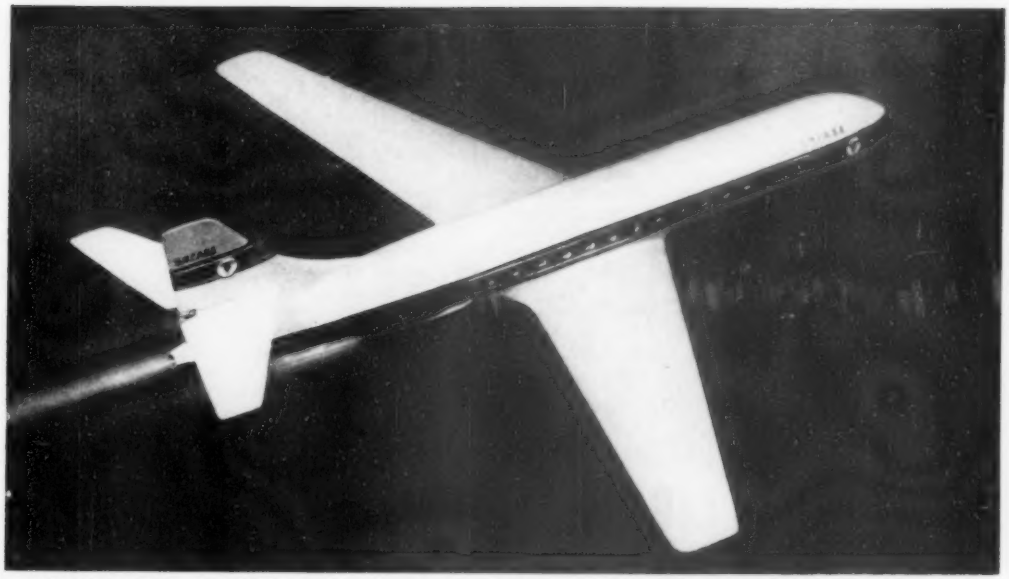
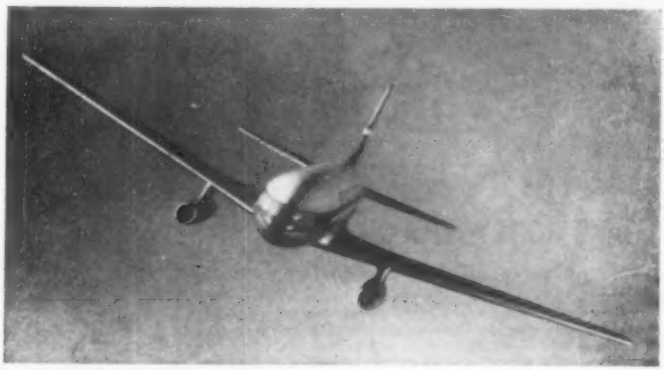
PITTSBURGH PLATE GLASS COMPANY



THREE-JET SNCASE medium transport, shown in model form, would have two 6,000-lb.-thrust Atar jets located behind the passenger cabin, another in the tail. Exhausts thus would not impinge on cabin. Freight would be stowed behind the cockpit.

New French Jet Liner Studies



SNCASO SO 60 model (above and at left) show how jet engines in pods are slung beneath the swept wings, each pod containing a large engine and a smaller auxiliary powerplant. Smaller engines would improve performance when operating in hot climates, or from high-altitude fields. SO 60 also features swept wings and tail. These model studies are being evaluated by the French Ministry of Civil Aviation as part of a design competition for a medium jet transport. Another design has been entered by Breguet. The Air Ministry is expected to authorize further development of one of the craft within a few months.

British Cut Back on Brabazon, Princess

(McGraw-Hill World News)

London—The government's decision to stop work on the Bristol Brabazon II and two of the three Saunders-Roe Princess flying boats now being built indicates Britain's big transport program is on the shelf for a long time.

Construction of these five giants already has cost the British $70 million, with very little to show. They were sitting ducks in the current economy drive. But there is another reason for the stoppage: the Bristol Proteus II turboprop engine, which was to have powered the Brabazon II and the Princesses, has been scrapped as obsolete. Soon to be announced is the Proteus III, about 700 lb. lighter than the Proteus II and considerably more powerful. Takeoff power of the Proteus III is estimated at 3,600 bhp.

Britannia's Engine—The Proteus III is being earmarked for the Bristol Britannia transport, 25 of which have been ordered by BOAC. The first Britannia, powered with a Proteus II, will fly this June. But service editions of the aircraft will have four Proteus III's. The demand for Proteus IIIs for the Britannia is such that it will be a few years at least before any will be available for the Brabazon II or the Princesses.

One Saro Princess, with ten Proteus IIs, eight of them coupled, will be completed and used for test purposes. Originally, the Ministry of Civil Aviation signed the contract with an eye to supplying BOAC. It was thought, the Air Ministry would use the Princesses as troop transports. By June of last year the cost of the project had risen to over $30 million from the original estimate of $7.9 million.

Brabazon I, with eight Bristol Centaurus piston engines, is still being used for test purposes. Brabazon II is being stored in the giant shed at Bristol which was built specifically to assemble Brabazons. Brabazon II is about half built—no engines or wing ends. The huge shed, which together with a special runway outside, cost the government $14.8 million, will now be used to assemble Britannias. Up until recently it was thought that Bristol would set up a production line for de Havilland Venom jet fighters in the old Brabazon shed. Plans for this have now been scrapped.

The whole Brabazon venture, which was originally estimated at $22.4 million, cost about $39.2 million before it was dropped. The Brabazon was built for BOAC, but no orders were ever placed.

While few voices here are being raised in defense of the Brabazon, there is considerable regret in aviation circles at the cutback of the flying boat program. There is still considerable feeling here that the flying boat has a future and many observers would like to see some action taken to prevent the last flying boat design teams—Saunders Roe and Short Bros.—from being broken up entirely.—**Nat McKitterick.**

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Always at correct tension

Lion Fasteners are *right* for buttoning parts that must be removed repeatedly for inspection, maintenance, or other reasons.

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Lion Fastener Spring Assembly is quickly spot welded or riveted in place. The stud cannot be lost. It is grommeted tight to the sheet. They will button sheets .040 plus or .020 minus over or under standard rating. The misalignment is as much as .156. The once-piece forged stud is tested to 1425 lbs. Write today for demonstration kit and application data.

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"Look here, I know we're travelling faster than sound but please stop answering my questions before I've asked them."

Hawker Siddeley Review

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* Chile	CC	Iraq	YI	* Saudi Arabia	HZ
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*** VICKERS AIRCRAFT HYDRAULICS IN USE**

This table includes all nationality marks that have been formally notified to ICAO up to September 30, 1951. Those countries marked with an asterisk have registered commercial aircraft which use Vickers hydraulics. Write to Vickers Incorporated for a 2½" x 4" plastic wallet card which gives you a permanent record of world civil aircraft registration codes.

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Set two rivets at a time with this new T-J Dual Rivitor! This machine is equipped with 10" hoppers, and tooled to automatically feed and set two ¼" dia. x ⅝" long wagon box hood rivets at a time in elevator chain and saddle or elevator flight assemblies for farm implements. Controlled by one foot pedal.
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Set two nuts at once with the new T-J Double Clinchor! This machine is tooled to feed and set ⅜" x ½" x 1/16" thick Fabri-Steel nuts at each operation. Both Clinchors are tripped by the same foot-operated valve. Adaptable to a wide range of clinch nut setting problems.

Save labor . . . speed up production with T-J Rivitors and Clinchors adaptable to a wide range of assembly jobs today . . . in aircraft, automotive, farm machinery, stampings of all kinds!

T-J Clinchors set clinch nuts 3 to 5 times faster! Fully automatic . . . controlled by a single foot pedal. Available in Underfeed and Gravity feed models, throat depths 8" to 36".

T-J Rivitors automatically feed and set solid rivets . . . with high production! Electrically-powered Rivitor sets 1/16" to ¼" diam. solid steel rivets up to ⅞" long. Air-powered Rivitor sets aluminum alloy rivets up to ¼" diam. or steel rivets up to ⅛" diam. and up to ¾" long. Throat depths 8" to 36"

Write for Clinchor bulletin 847; Rivitor bulletins 646 and 847. The Tomkins-Johnson Company, Jackson, Mich.

T-J Rivitor used for automotive clutch plate assembly. Saves time and labor doing a four-fold job—assembling, setting, inspecting and ejecting.

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NACA Report

Boundary-Layer Flow

► Unsteady Laminar Boundary-Layer Flow (TN 2471)—By Franklin K. Moore.

The trajectory of the usual rocket missile shows variations in speed and atmospheric properties over its entire path. In analyzing such a trajectory, the important boundary-layer effect in friction and heat transfer must be considered as unsteady for the entire flight.

This report is a further contribution to the literature of unsteady boundary-layer flow. This research, conducted at the Lewis Laboratory of the National Advisory Committee for Aeronautics, considered the case of compressible laminar flow over a semi-infinite flat plate in rectilinear accelerated flight through still air. Flight speed was allowed to vary with time in a continuous but arbitrary manner. These conditions represent an idealized missile flight.

The analysis shows that a group of parameters are developed whose magnitude determines the nature of the flow unsteadiness. If these parameters are very large, the classical solution applies for flow starting from rest. If these parameters are very small, the flow may be regarded as nearly quasi steady, that is, at any instance the motion is nearly that which would be obtained in steady flow at the conditions prevailing at that instant.

Society to Discuss Future of Rockets

The adventurous past and the dramatic future of rocket progress will be highlighted at a dinner meeting sponsored by the American Rocket Society at the Hotel Astor, New York, on Thursday, May 22, 1952.

The meeting will mark 20 years of U. S. rocket progress that started when the original few members of the Society constructed their first rocket test missile and developed their first liquid-fuel motor.

Linking past to present will be presentation of the Society's first motor test stand by Dr. G. Edward Pendray to Raymond C. Young, president of Reaction Motors, Inc. Young will accept the stand for display in RMI's museum.

And for a look at the future, Dr. Wernher von Braun, technical director of guided missile development for Army Ordnance, will describe man's next frontier in space. Dr. von Braun also began his work with rockets about 20 years ago.

Reservations for the dinner should be made through the Society's office at 29 West 39th Street, New York 18. Subscription is $7.70 per plate.

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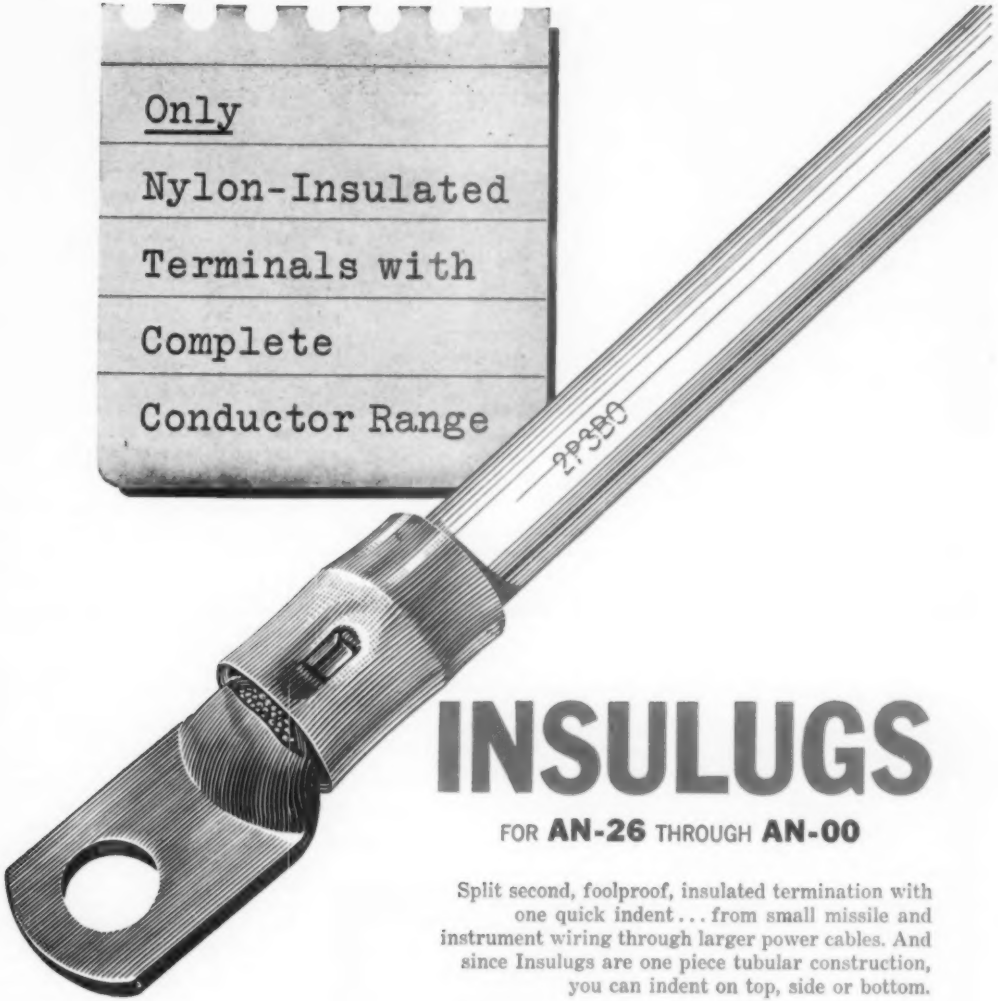

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Two range taking hand tools will handle *all* sizes of terminals and fast mass production tooling is also available to meet your assembly, jig board or in-plane requirements.

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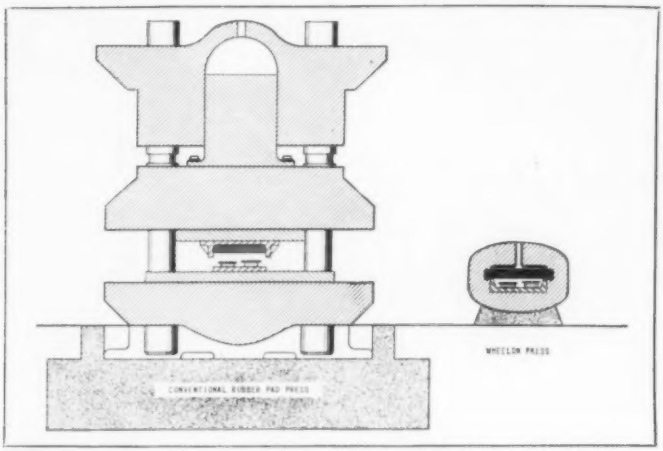


MIDGET at right, which will do same job as the large unit at left, is a . . .

Small Press Designed for Big Job

New direct-acting hydropress may replace units ten times as heavy and costing four times as much.

A new hydropress invented by an engineer of an airframe company probably is the most promising of current aircraft production tools—it is small, inexpensive, saves time, but packs a mighty punch.

O. A. Wheelon, production design engineer for the Santa Monica division of Douglas Aircraft Co., Inc., developed the press to handle the heavier metal gages specified for today's aircraft.

► **Little Giant**—A little press by conventional standards—about one-tenth the size of the usual hydropresses found in aircraft factories—it is a giant for work. It operates at three times the conventional working pressures and reduces the handwork after pressing by about half.

Initial cost is expected to be about one-quarter that of conventional presses offering the same capacity. Production of the unit is simple; it uses little steel and no critical materials.

The press is small and inexpensive enough to become part of the shop equipment of small subcontractors.

► **Wheelon Honored**—Wheelon described his design at a press conference in New York, Apr. 23, the day he received the Wright Brothers Medal from the Society of Automotive Engineers. The medal was awarded for his 1951 paper "Design and Manufacturing Techniques with Titanium."

"We're in a state of transition in aircraft production," he said, "and it's comparable to the changeover from stick and wire to all-metal. We've got to learn a lot of new ways to fabricate parts out of the heavier gages we are forced to use now."

One of these new ways is exemplified in the Wheelon Direct Hydraulic Press. It is intended for the shallow forming of metal, a job currently done on rubber-pad presses throughout the aircraft industry. Most of the metal forming in the manufacture of airplanes is done by this process.

O. A. WHEELON, Douglas Santa Monica production design engineer who developed new press, recently won SAE's Wright Brothers Medal for paper on titanium working.

► **Forming Advance**—Basically, Wheelon's ideas represent an extrapolation of the earlier Guerin process for rubber-pad forming of aircraft parts. The Guerin method, standard practice throughout the aircraft industry, was developed at Douglas in 1935. Its technique is familiar.

A sheet metal blank is placed on a male die, and a rubber pad is forced down over the blank and die. Pressure of the pad on the work forms the metal.

This process is simple and uses inexpensive tooling. There is no setup time; dies are literally thrown on the press bed. But there are drawbacks. You do not get complete forming. You can't get a return flange or a C-section. And you generally have to do a lot of handwork—pounding and trimming—to finish the pressed part to correct dimensions.

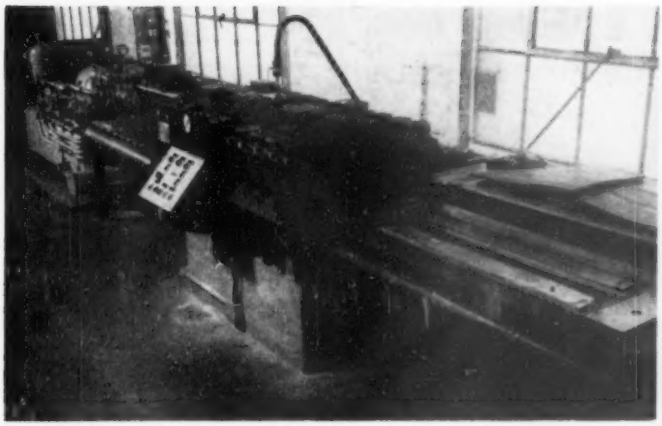
These drawbacks were exaggerated with the trend to heavier metal gages for aircraft parts. Machining and forging seemed like the wrong approach to Wheelon and he decided to have another look at the basic Guerin process.

He figured that replacing the rubber pad with a hydraulically inflated bladder backing up a pad was a promising approach; structural and cost studies supported his ideas. Early in 1951 Douglas decided to go ahead with a prototype with bed size ". . . big enough, if the design were right, to do us some good; and small enough, if it were wrong, not to break us."

The pilot model—with a 20x50-in. bed—was installed in the Santa Monica production department this January. The first parts were made just a little over three months after construction started.

► **Press Data**—The pilot model operates at 5,000 psi. (Guerin process normally operates around 1,000 or 1,500 psi.) and exerts a total force of 2,500 tons on its bed.

There are no moving parts except the bed. It is loaded in the same manner as the Guerin-process presses, with blanks placed on male dies. Here there is one difference; Masonite dies—or any dies of soft material—will not stand up on high-production runs in the Wheelon press. Aluminum and Kirksite dies are recommended, and for the anticipated hot working of magnesium and titanium, steel dies will be needed.



PILOT MODEL of Wheelon press is installed at Douglas Santa Monica plant.

The working pad in the roof of the press is softer and has more elongation than the conventional rubber pad. This means that pressures on the side of the block are as high as those on the upper faces.

Throw pads are suggested to protect working pad surface from the sharp edges of the metal blanks.

Production runs with sheet of up to ¼-in. thickness have been made with the Wheelon press and the results have been much better than the same work on conventional presses.

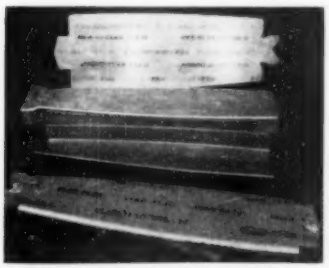
Floor space for the Wheelon press is minimum; only an 8-ft. ceiling height is required. The only foundation necessary is used to bring the press to working height.

► **Future Plans**—The size expected to be most popular with buyers of the press has a 36x120-in. bed. At rated pressure of 5,000 psi., this means a rated total tonnage of 10,800. With the possible 10,000-psi. pressure, press tonnage is doubled to 21,600 tons.

Prototype bed permits 3-in.-high die-block working depths. This value should be increased, says Wheelon, and the most logical solution appears to be a 4-in. depth on full-bed area with a removable section with maximum depth of 6 in.

Because of the metal saving in the construction of the Wheelon press, buyers will get the same total rated tonnage as from a conventional press for about one-tenth the weight of steel. Cost of the new press is expected to run between 20 and 30% of conventional press cost for same capacity.

The Wheelon press will be manufactured and marketed under license from Douglas by the Verson Allsteel Press Co., Chicago.



METAL BLANK of precut 75S aluminum (top) is formed on Wheelon press by Kirksite block shown under the blank into parts in lower half of picture.

USAF CONTRACTS

Following is a list of recent USAF contracts announced by Air Materiel Command.

American Type Founders, Inc., Elizabeth, N. J., printing presses, 11, $83,842.

Basca Manufacturing Co., Indianapolis, aircraft seats & cushions, $96,773.

Bassick Co., Bridgeport, Conn., commercial hardware, $58,158.

Becco Sales Corp., Station B, Buffalo, hydrogen peroxide drum deposit, $198,750.

Bell & Howell Co., Chicago, cameras, $84,414.

Bendix Aviation Corp., Bendix Products div., South Bend, wheel and brake assembly, $1,031,792.

Boice Crane Co., Toledo, band saws, 365, $91,399.

Buchsbaum, S., and Co., Chicago, bag, water, $283,484.

Carbide & Carbon Chemicals Co., Union Carbide & Carbon Co., 30 E. 42 St., New York, ethylene glycol, $42,875.

Cincinnati Lathe & Tool Co., Cincinnati, lathes, 133, $564,989.

Consolidated Photo Engravers & Lith. Equipment Co., Chicago, height-finder film, 27, $43,089.

Consolidated Vultee Aircraft Corp., San Diego, kits, $112,234.

Eagle Electric Manufacturing Co., Inc., Long Island City, telegraph repeater, 500, $127,103.

Eastman Kodak Co., Rochester, photomechanical film, $112,450; developing kits, $32,765.

Eastern Rotocraft Corp., Willow Grove,

designers-producers of AIRCRAFT COMPONENTS

AN Fittings

Special Fittings

Flexible Metal Hose Assemblies

Silicone Rubber Hose Assemblies

We will be pleased to quote on all AN fittings and special aircraft components. Write or phone for further information.

AIRCRAFT COMPONENTS DIVISION OF DUNBAR KAPPLE, INC.

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Seattle 9, Washington
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RUSCO for Safety Belts

Here is another example of Rusco Research, a shoulder strap for every Rusco Safety Belt.

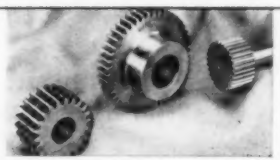
Good practice requires that safety belts be replaced periodically.

Why don't you replace yours now with a famous Rusco Safety Belt.

THE RUSSELL MANUFACTURING CO.
Middletown, Conn.
New York - Chicago - Detroit - San Francisco

HIS FISHING TRIP WON'T BE SPOILED BY GEAR WORRIES

He knows from past experience that his gears will be produced as specified. He is only one of hundreds of customers who have Vinco working at capacity. They know that the name Vinco is synonymous with dependability — true yesterday, today and tomorrow. These customers also agree that Vinco has no peer in the spline gage field. So if you require spline gages or a gaging program, consult Vinco at once.



MASTER GEARS
Master spur, worm and helical gears, by Vinco, are the ultimate in precision and finish. Men who know, have Vinco make their master gears.

The Trademark of Dependability

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MILLIONTHS OF AN INCH FOR SALE

VINCO CORPORATION
9111 Schaefer Hwy., Detroit 28, Mich.

Pa., swash plate exciter, $24,845.

Eclipse-Pioneer div., Bendix Aviation Corp., Teterboro, N. J., indicators, 16,663 ea., $55,154.

Fairchild Aircraft div., Fairchild Engine & Airplane Corp., Hagerstown, Md., aircraft, $79,000.

Fairchild Camera & Instrument Corp., 88-06 Van Wyck Blvd., Jamaica, Long Island, N. Y., cameras, 1,249 ea., $100,000.

Fairchild Engine div., Fairchild Engine & Airplane Co., Farmingdale, L. I., N. Y., powerplant, 1,978, $2,235,180.

Federal Aircraft Works, Minneapolis, ski assemblies, 10, $75,635.

Federal Telephone & Radio Corp., Clifton, N. J., transformers, rectifiers, 518, $106,627.

General Electric Co., Schenectady, N. Y., indicator, 4,296, $76,272.

Goldsmith Bros. Smelting & Refining Co., Chicago, silver anodes, sheet form, 200,000, $182,420.

Gosiger, C. H., Machinery Co., Dayton, lathes, 85, $977,321.

Greer Hydraulics, Brooklyn, N. Y., stand assembly, $35,390.

Hartman Electrical Mfg. Co., Mansfield, Ohio, relay, overvoltage, generator system, 13,702, $195,958.

Hewlett Packard Co., Palo Alto, Calif., voltmeter, $42,280.

Houston-Fearless Corp., Los Angeles, processing machine, 241, $1,026,509.

Jack & Heintz, Inc., Cleveland, starters, 3,712, $1,053,951; generators, 2,134, $1,109,347; starters, $628,149.

Keystone Watch Case div., Riverside Metal Co., Riverside, N. J., indicator, 4,296, $71,093.

Kidde, Walter, & Co., Inc., 675 Main St., Belleville, N. J., gun charger, 427 ea., $42,204.

Kindred Aviation Corp., 3519 Pacific Ave., Burbank, Calif., transmitters, 150 ea., $75,000.

Kollsman Instrument Corp., Elmhurst, N. Y., indicator, airspeed, 1,339, $252,605.

Leland Electric Co., 1501 Webster St., Dayton, inverters, 1,354 ea., $651,305.

Lewis Engineering Co., Naugatuck, Conn., indicator, temperature, 2,636, $53,172; indicator, temperature, 3,632, $73,549; indicator, temperature, $54, 465; leads, thermocouples and harness, $137,604; indicator, temperature, 4,733, $205,257.

Oliver Corp., 400 West Madison St., Chicago, main fuselage, $512,000.

Pacific Div., Bendix Aviation Corp., North Hollywood, Calif., miscellaneous assemblies, $50,000; bladder assembly, $72,310.

Parker Appliance Co., 17325 Euclid Ave., Cleveland, machinery & equipment, $2,200,000.

Peer, Inc., 1200 Milton St., Benton Harbor, Mich., welders, 190 ea., $266,380.

Pioneer Parachute Co., Inc., Manchester, Conn., parachutes, $117,575.

Regents Manufacturing Co., Inc., Downey, Calif., hydraulic axle jack, $41,998.

Rockwell Manufacturing Co., Delta Power Tool div., Milwaukee, saw, band, woodworking, 103, $137,917.

Rosenberg, H. Z., & Co., Buffalo, aircraft parts & equipment, $26,907.

Sampsel Time Control, Inc., Spring Valley, Ill., power unit, 3,036, $2,491,445.

Seifreit Elstad Machinery Co., Dayton, milling machines, 69, $1,071,766.

South Bend Lathe Works, South Bend, lathes, 339, $609,730.

Starco Chemical Co., Houston, paint remover, 62,400, $97,096.

Tulsa Aircraft Parts Co., Tulsa, heater & package assembly, 500 ea., $59,000.

Waco Aircraft Co., Troy, Ohio, dome assemblies, turret, 100, $105,738.

Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark, N. J., indicator, 2,676 ea., $54,184; indicator, 3,951 ea., $79,821; indicator, 5,450 ea., $110,359.

Airborne Instr. Lab. Inc., Mineola, N. Y., indicator kit, $500,000.

AiResearch Mfg. Co., 9851 Sepulveda Blvd., Los Angeles, spare parts, $151,852; spares for turbine assys., $105,811; maintenance parts, $53,7987.

Alloys Prods. Corp., 1045 Perkins Ave., Waukesha, Wis., cylinder assy., 740 ea., $136,900.

Aluminum Co. of America, Pittsburgh, Pa., aluminum sheets, $4,350,000.

Marquette

WINDSHIELD WIPERS

provide a safety factor on the

SUPER CONSTELLATION

The Marquette
METAL PRODUCTS CO.
CLEVELAND 10, OHIO
SUBSIDIARY OF CURTISS-WRIGHT CORPORATION

Also Manufacturers of
ROLLER BEARING TEXTILE SPINDLES
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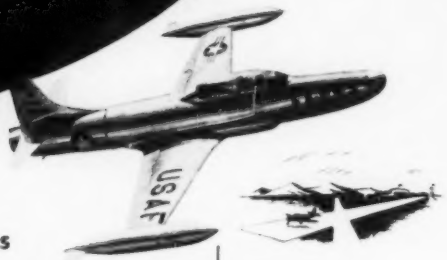
LOCKHEED



Uses

MELETRON

Pressure Actuated
SWITCHES

Wherever a system calls for control, actuated by pressure changes, there is a MELETRON product to handle the job.

Specified on the Lockheed F 94

Meletron pressure switches are known by the customers they serve

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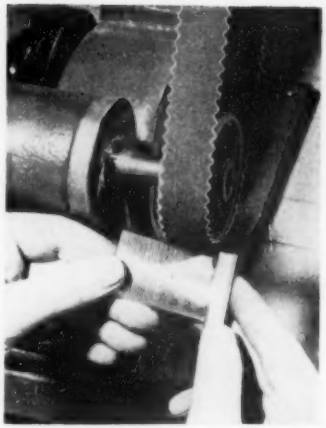
J. M. WALTHEW CO., *Boeing Field, Seattle.*
THOMSON ENGINEERING SERVICE, 708 *Hemphill St., Fort Worth.*
ROUSSEAU ENGINEERING & SALES, *Montreal Airport, Dorval, Canada.*



Scallop-Edge Grinding Belt

Designed for automatic precision grinding and finishing of jet turbine and compressor blades in a single operation, the new Scallop-Edge abrasive belt has been introduced by Minnesota Mining and Manufacturing Co., St. Paul, Minn.

The belt's scallops curve around the edges of the contact wheel, permitting fillet areas to be polished on the wheel's edge-contours. Previously, two separate operations—foil grinding and root grinding—were required. The belt can be used on crowned, contoured or rounded-edge wheels, or with shaped back-up supports, either by machine or by hand.

All standard abrasive belt constructions are available on 15-day delivery, the company says.

PRODUCTION BRIEFING

► **AiResearch Manufacturing Co.**'s customer service department has been moved to its own quarters in a 33,000-sq. ft. building adjacent to Los Angeles International Airport.

► **Chase Aircraft Co.**, W. Trenton, N. J., plans gradually to transfer its operations to Willow Run, Mich. Move will provide additional space and closer coordination with C-123B production there.

► **Lincoln-Mercury division** of Ford Motor Co., has broken ground for Navy J40 production plant near Romulus, Mich. Facility is scheduled for completion next year.

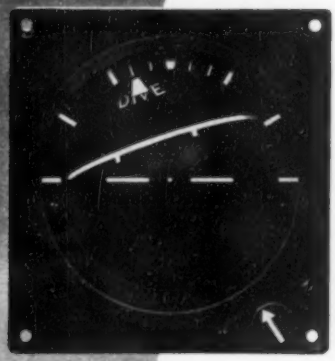
► **Mooney Aircraft, Inc.**, Wichita, is stepping up Mite 18 plane production to

(*Continued on page 52*)

Selected
FOR FAST JET AIRCRAFT

THE LEAR VERTICAL GYRO INDICATOR approaches the ultimate in design simplicity for flight attitude indicators. The unique Pitch-Bank Erection System reduces turn-error to a minimum, and the fast, automatic initial erection requires no caging or attention from the pilot. Its large spread presentation permits quick, easy readings, so vital in today's high performance aircraft.

NOW IN QUANTITY PRODUCTION, it is but one of many LEAR Gyro instrument products resulting from close customer coordination and the skilled application of the most advanced principles of design, engineering and precision manufacturing.



Type B-1 Indicator
used with type K-4 Control

THE LEAR VERTICAL GYRO INDICATOR SYSTEM has been developed by LEAR, INC. in co-ordination with the **USAF** and has been selected for many of the high-speed jet aircraft now under construction.

LEAR LEADERSHIP in the electronics and electro-mechanical field is reflected in the superior equipment used in today's advanced engine, airframe, and missile construction.

LEAR INC., GRAND RAPIDS, MICHIGAN

East Detroit Div., Elyria, Ohio

Electro-mechanical flight control and servo systems • Power tool relay and servo motor equipment • Autopilots and gyro components • Control motors • Aircraft radio

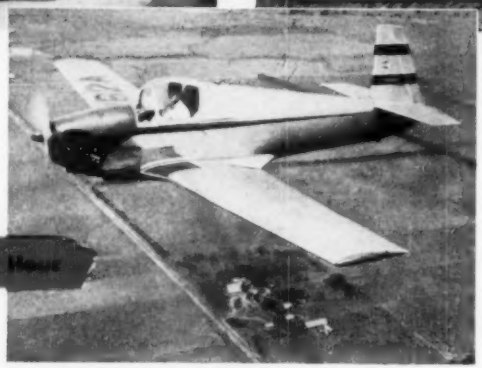
FLYING WITH THE

Colonial Airlines' slogan "Safety Is No Accident" is well proved in this outstanding performance record. Colonial uses Flying Red Horse products.

Pan American World Airways Atlantic Division chalked up this record in a single 3-year period. Pan American uses Mobilgas Aircraft, Mobiloil Aero.

B-36's—world's largest and longest-ranging bombers—in production by Convair for the Air Force, use Flying Red Horse products during development tests.

New twin-engine Aero Commander made record flight with one propeller removed—used Mobilgas Aircraft, Mobiloil Aero!



Bob Faris, piloting Mooney Mite in 1230-mile non-stop record for midget planes, proved economy of Flying Red Horse products!

PACING AIR PROGRESS SINCE HISTORY'S

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

RECORD MAKERS_

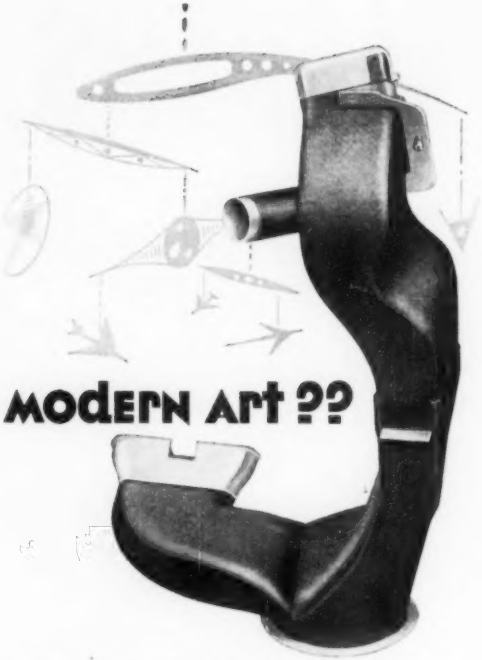
Flying Red Horse Products Help Set All Kinds of New Marks!

To the Wright brothers at Kitty Hawk—to Admiral Byrd, Lindbergh, Amelia Earhart, Wiley Post and other leading air pioneers—the sign of the Flying Red Horse has meant record-making performance and safety.

Today's pioneers, too, rely on this famous sign for proved flight protection.

So take the tip... Whether you're out to set a new record or take an easy-stage cross-country flight, fill up with Mobilgas Aircraft, assure smooth engine performance with Mobiloil Aero. They're available at airports from coast to coast, border to border!

FIRST FLIGHT!



Modern Art ??

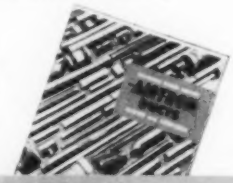
YES, IT'S MODERN ENGINEERING ART—

the art of fabricating Fiberglass ducts in shapes too complex for conventional materials. Arrowhead Rubber Company's custom-built Airtron ducting, made of flexible rubber impregnated Fiberglass, offers many advantages over metal. Ducts designed to individual customer specification can be made to practically any conceivable shape in experimental or production quantities at cost savings frequently as much as 45%. Tooling costs are reduced to a fraction—as compared with metal. Costly metal forming, riveting, welding and sealing are eliminated.

Airtron ducts offer other unique features. Weight savings up to 50% are possible. Flexibility allows crushing without damage and easier installation. They are self-insulating, immune to vibration and corrosion, can be made to close tolerances with metal fittings, flanges and other features built in.

The Airtron duct shown above solved a cramped space problem encountered in the design of a heavy bomber. It's typical of countless unusual ducting problems which Arrowhead engineers specialize in solving.

WRITE FOR CATALOG
on Airtron and name of nearest sales engineer.
Dept. A-400



O 'O' RINGS
AIRTRON DUCTS
ARCOSIL SILICONE RUBBER PRODUCTS

ARROWHEAD RUBBER COMPANY

DOWNEY, CALIFORNIA (Los Angeles County)
FIRST commercial manufacturers of precision 'O' rings. PIONEER fabricators of silicone rubber. ORIGINATORS of rubber-fiberglass ducting.

(Continued from page 48)

meet increased demands. Deliveries are being made to Strategic Air Command, Aero Clubs, and negotiations are underway for a fleet for forest patrol service.

▶ **Precision Gears & Products, Inc.**, Paterson, N. J., is making gears for the Wright-built J65 Sapphire turbojet engine for distribution among Wright and Buick contractors. The firm's government backlog is over $1 million.

▶ **John B. Ruby Co.**, Burbank, Calif., has secured 4,000 sq. ft. of new plant and office space at 1023 South Flower St., Burbank, including space for electronic assembly and test, warehouse and parts stocking space for aircraft parts.

▶ **Sprague Engineering & Sales Corp.**, Los Angeles, Calif., has moved into a new 20,000-sq. ft. facility. The company makes specialized aircraft test equipment and products for general industry.

▶ **Weber Showcase & Fixture Co.** and its subsidiary, Weber Aircraft Corp., have been awarded contracts by Douglas Aircraft Co. for approximately $5 million for all doors, including the nose clamshells, on the C-124 Globemaster transport.

Certificates Of Necessity

Accelerated tax amortization for manufacturers expanding their defense facilities is granted by the government in the form of certificates of necessity.

In the following list of recent certificates, company name is given, followed by product or service, cost of construction deemed necessary for defense expansion but of no likely civilian use after the emergency, and the percentage of the expansion cost allowed for fast tax write-off. Fast write-off permits property to be depreciated in five years, rather than 20-25 years.

- **Zul Machine Works, Inc.**, Lindenhurst, L. I., N. Y., aircraft parts, $39,962, 80%.
- **A. Cresci and Sons, Inc.**, Vineland, N. J., aircraft parts, $14,849, 80%.
- **Empire Tool Products Co., Inc.**, New York, aircraft parts, $9,697, 80%.
- **Air Associates, Inc.**, Marcus Hook, Pa., aircraft parts, $167,461, 75%.
- **Etched Products Corp.**, Long Island City, N. Y., aircraft parts, $46,149, 50%.
- **Kearfott Co., Inc.**, Little Falls, N. J., parts for AF and Navy, $29,941, 70%.
- **Continental-Diamond Fibre Co.**, Newark, Del., aircraft parts, $30,725, 50%.
- **Aluminum Cooling Utensil Co.**, New Kensington, Pa., aircraft parts, $75,920, 65%.
- **ACF-Brill Motors Co.**, Philadelphia, aircraft parts, $60,522, 65%.
- **Universal Lubricating Systems, Inc.**, Oakmont, Pa., aircraft parts, $22,888, 50%.
- **Kuehler-Huhn Co., Inc.**, Philadelphia, aircraft parts, $12,137, 80%.
- **Continental Rubber Works**, Erie, Pa., aircraft and ordnance parts, $24,498, 50%; $8,331, 50%.
- **Frank G. Schenuit Rubber Co.**, Baltimore,

aircraft tire testing, $33,914, 80%.

- **Fairchild Engine & Airplane Co.**, Hagerstown, Md., cargo airplanes, $98,761, 65%.
- **Delta Air Lines, Inc.**, Atlanta, air transportation, $6,390,836, 80%.
- **Hydraulic Press Mfg. Co.**, Mt. Gilead, Ohio, aircraft parts, $380,000, 65%.
- **Detroit Harvester Co.**, Paris, Ky., aircraft engine parts, $600,000, 70%.
- **Lamb Electric Co.**, Kent, Ohio, aircraft components, $150,657, 75%.
- **Ciro Cameras, Inc.**, Delaware, Ohio, aircraft parts, $19,420, 80%.
- **Jackson and Church Co.**, Saginaw, Mich., aircraft and ordnance, $158,350, 80%.
- **Colonial Machine Co.**, Kent, Ohio, aircraft and ordnance parts, $32,000, 50%.
- **Roberts Brass Mfg. Co.**, Detroit, aircraft parts, $7,710, 80%.
- **Great Lakes Mfg. Corp.**, Cleveland, aircraft parts, $44,154, 80%.
- **Advance Die and Tool Co.**, Cleveland, aircraft and ordnance parts, $19,887, 80%.
- **Holt Products Co.**, Holt, Mich., aircraft and ordnance parts, $16,553, 65%.
- **C and E Mfg. Co.**, Detroit, aircraft parts, $57,634, 75%.
- **Moore Drop Forging Co.**, Chicopee, Mass., aircraft, $78,250, 75%.
- **Liberty Products Corp.**, Farmingdale, L. I., N. Y., aircraft parts, $81,330, 70%.
- **Aluminum Co. of America**, Massena, N. Y., aircraft parts, $660,200, 65%.
- **Shakespeare Co., Kalamazoo, Mich.**, aircraft instruments, $19,747, 70%.
- **The Barco Machine Products Co.**, Cleveland, aircraft parts, $12,455, 80%.
- **Nash-Kelvinator Corp.**, Kenosha, Wis., aircraft engines, $6,876,115, 65%.
- **Acme Industrial Co., Chicago**, aircraft parts, $71,836, 80%.
- **Mykroy, Inc.**, Horton Grove, Ill., aircraft parts, $39,000, 40%.
- **The O. A. Sutton Corp.**, Wichita, aircraft parts, $138,000, 65%.
- **Aluminum Co. of America**, Vernon, Cal., aircraft parts, $673,500, 65%.
- **Moto-sway Corp. of America**, South Pasadena, Calif., aircraft parts, $23,040, 80%.
- **Rohr Aircraft Corp.**, Chula Vista, Calif., aircraft parts, $41,738, 65%.
- **Grimley Engineering Corp.**, Glendale, Calif., aircraft research, $11,409, 80%.
- **Boeing Airplane Co.**, Seattle, aircraft, $508,191, 65%.
- **Lombard Governor Corp.**, Asland, Mass., aluminum castings, $2,368,000, 65%.
- **Aetna Steel Products Corp.**, Bridgeport, Conn., spherical bearings for aircraft, $32,873, 65%.
- **American Locomotive Co.**, Dunkirk, N. Y., aircraft parts, $31,900, 50%.
- **Wheaton Brass Works**, Union, N. J., aircraft parts, $18,993, 65%.
- **Schock, Gusmer and Co., Inc.**, Hoboken, N. J., control units for copters, $171,207, 80%.
- **Bendix Aviation Corp.**, Eatontown, N. Y., aircraft parts, $1,487,000, 65%.
- **Micro Balancing, Inc.**, Garden City Park, L. I., N. Y., dynamic balancing machine for aircraft, $27,500, 45%.
- **H. A. Wilson, Union**, N. J., aircraft parts, $1,215,000, 40%.
- **New Rochelle Precision Grinding Corp.**, New Rochelle, N. Y., aircraft parts, $47,949, 80%.
- **David Bell Co., Inc.**, Buffalo, N. Y., aircraft parts, $26,000, 80%.
- **Twin Coach Co. Aircraft Div.**, Cheektowaga, N. Y., aircraft parts, $60,000, 65%.
- **The Rotary Co.**, Buffalo, aircraft parts, $12,709, 65%.
- **Dial Light Co. of America**, Brooklyn, N. Y., aircraft parts, $560,000, 50%; $49,400, 65%.
- **Westinghouse Electric Corp.**, Trafford, Pa., aircraft pulleys, $425,000, 45%.
- **Clary Multiplier Corp.**, Downington, Pa., aircraft parts, $11,520, 65%.
- **All American Airways, Inc.**, Wilmington, Del., aircraft parts, $29,373, 75%.
- **American Machine and Metals**, Sellersville, Pa., aircraft parts, $200,000, 65%.
- **Kennametal, Inc.**, Bedford, Pa., aircraft parts, $224,700, 50%.
- **Lord Mfg. Co.**, Erie, Pa., aircraft parts, $570,968, 70%.
- **Hetherington, Inc.**, Sharon Hill, Pa., aircraft parts, $19,116, 75%.
- **Revere Copper & Brass, Inc.**, Baltimore,

Compressor—3000 PSI 2 CFM
Integral 220 Volt 3 phase A.C. Motor
Compressor—3000 PSI 2-3 CFM
Hydraulic Pressure
Cornelius
PNEUMATIC
SYSTEMS FOR
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Compressor—1500 PSI .4 CFM
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Aviation engineers look to Cornelius for Aircraft Pneumatic Systems. A valued recognition which has developed from many years of specialized work in this field.
When you specify Cornelius Pneumatic Equipment you will obtain the benefits of years of engineering, research and production experience gained in developing and building pneumatic systems for aircraft. You are invited to contact or write us for complete information.
THE CORNELIUS COMPANY
MINNEAPOLIS 1, MINNESOTA
"Pioneers in Pneumatic Systems for Aircraft"
Air Bottles
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The Smoothest DRIVE---

LORD
Shear-Type Flexible Couplings

Here is the bonded-rubber flexible coupling service that you may need . . . the result of analyzing specific coupling requirements.

Lord Shear-Type Flexible Couplings deliver the smoothest power because of the torsional softness of elastic materials stressed in shear. This softness cushions the shocks of starting and stopping . . . it prevents the transfer of shock loads to bearings and gears . . . places natural frequencies beyond operating speed ranges . . . acts as a mechanical fuse to disconnect equipment under overload or stall conditions.

Lord Shear-Type Flexible Couplings are engineered specifically for the work they must do . . . they prolong the service life of driven equipment . . . operate quietly . . . need no lubrication . . . prevent transmittance of noise between shafts . . . cannot be damaged by dust, dirt, abrasives.

For smooth, noiseless, uniform drive, there is a Lord Flexible Coupling from 1/50 to 100 hp. @ 1750 r.p.m. that will pay you a handsome profit.

Before selecting a coupling for your requirement consult with your Lord Engineer. Write or call—

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DAYTON 2, OHIO
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Michigan 8871

BURBANK, CALIFORNIA
233 South Third Street
ROckwell 9-2151
CHarleston 6-7481

CHICAGO 11, ILLINOIS
520 N. Michigan Ave.
Michigan 2-6010

NEW YORK 16, NEW YORK
280 Madison Avenue
MUrray Hill 5-4477

DALLAS, TEXAS
1613 Tower Petroleum Building
PRospect 7896

ERIE, PENNSYLVANIA
1635 West 12th Street
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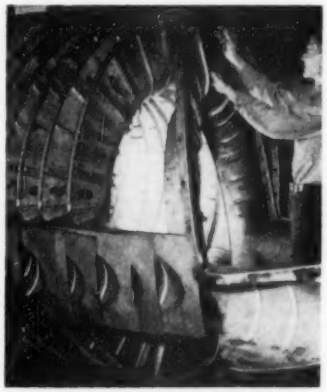
LORD BONDED RUBBER

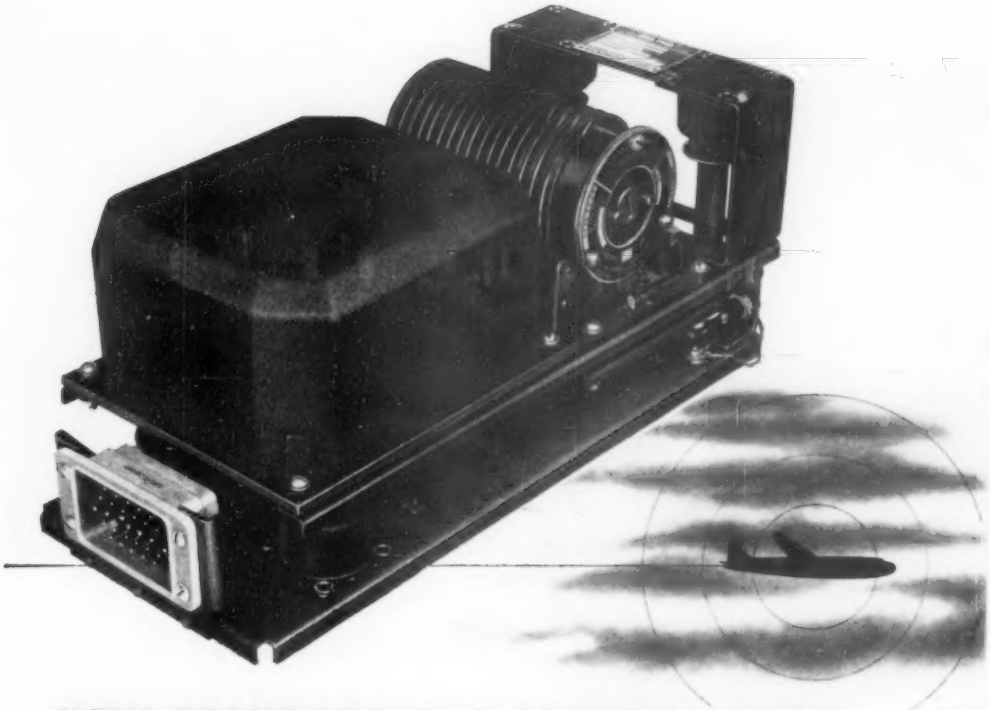
HEADQUARTERS FOR
VIBRATION CONTROL MOUNTINGS
. . . BONDED RUBBER PARTS

aluminum sheet for aircraft, $362,841, 80%.

- **The Glenn L. Martin Co.**, Middle River, Md., aircraft and parts, $193,498, 75%.
- **Specialties, Inc.**, Charlottesville, Va., aircraft fire control systems, $3,473,886, 65%.
- **General Development Corp.**, Elkton, Md., aircraft parts, $75,000, 65%.
- **United Aircraft Corp.**, Sikorsky Aircraft Div., Bridgeport, Conn., helicopters, $1,583,200, 75%; $879,200, 70%; $1,742,777, 65%.
- **Clifford Manufacturing Co.**, Waltham, Mass., aircraft parts, $156,690, 65%.
- **Meisel Press Mfg. Co.**, Boston, aircraft engine parts, $8,500, 80%.
- **Parsons Tool Inc.**, Berlin, Conn., aircraft parts, $14,635, 75%.
- **The M. B. Manufacturing Co.**, New Haven, Conn., aircraft parts, $75,528, 80%.
- **The Lewis Engineering Co.**, Naugatuck, Conn., aircraft parts, $37,193, 65%.
- **E. A. Patten Co.**, Manchester, Conn., aircraft parts, $78,000, 55%.
- **Plane Parts, Inc.**, New Haven, Conn., aircraft engine parts, $11,896, 80%.
- **Joseph Pollak Corp.**, Boston, aircraft and ordnance parts, $28,835, 65%.
- **Special Machine Tool Engineering Works**, N. Y., aircraft parts, $41,224, 45%.
- **New York Gear Works**, Richmond Hill, N. Y., aircraft parts, $9,555, 80%.
- **American Locomotive Co.**, Dunkirk, N. Y., aircraft engine containers, $166,724, 60%.
- **Magnus Tool and Die Co.**, Newark, N. J., aircraft parts, $23,930, 80%.
- **Anderson Aircraft, Inc.**, N. Y., aircraft parts, $161,718, 70%.
- **Bol, Ltd.**, N. Y., aircraft cameras, $56,686, 75%.
- **Island Machine Co., Inc.**, Farmingdale, N. Y., aircraft parts, $23,432, 75%.
- **S. G. Adams**, St. Louis, aircraft parts, $15,000, 80%.
- **Weston Electrical Instrument Corp.**, Newark, N. J., aircraft navigational instruments, $379,332, 65%.
- **Camloc Fastener Corp.**, Paramus, N. J., aircraft parts, $276,000, 45%; $55,787, 50%.
- **The Glenn L. Martin Co.**, Middle River, Md., aircraft, $150,480, 65%.
- **Reynolds Metals Co.**, Richmond, Va., aircraft parts, $74,800, 65%.
- **National Airlines, Inc.**, Miami, air transportation, no figures given.
- **Plough, Inc.**, Memphis, aircraft parts, $56,850, 80%.
- **American Airmotive Corp.**, Miami, overhaul of aircraft engines, $4,900, 65%.



C-119 PARTS UNDERGO CHECK
A Fairchild Aircraft division powerplant installer draws last-minute trim lines on one of a batch of stainless steel baffle rings at Hagerstown, Md. The rings form a fire seal between the P&WA R-4360's combustible forward section and the maze of fuel and oil lines which lead into the rear of the engine.



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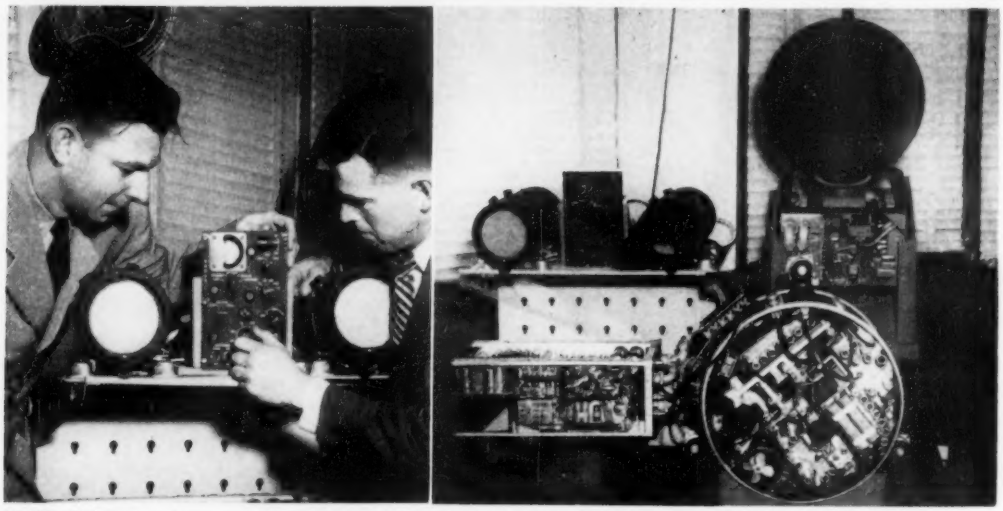


NAVY AND RCA engineers examine their latest navigational radar. Photo at right shows complex interior of the equipment.

Navy Unwraps APS-42 Transport Radar

Renewed airline interest in radar focuses attention on improved storm and terrain warning features.

By Philip Klass

The Navy has taken the security wraps off its new AN/APS-42, the first U.S. transport radar specifically designed to warn of dangerous terrain and hazardous weather.

The unveiling is well timed because the airlines are currently investigating radars to help them avoid turbulent thunderstorms and dangerous terrain.

Produced by Radio Corporation of America, the new APS-42 has an airline heritage. American Airlines played a major role in developing the original specification for this first postwar transport radar, based on tests of the World War II AN/APS-10 (AVIATION WEEK Apr. 14, p. 70).

The new radar is designed for ground mapping (navigation) and for displaying ground radar beacons to permit offset track flying. But its major innovations are in the field of weather and terrain warning.

► **X-Band**—Like its APS-10 predecessor, the APS-42 is an X-band radar, operating at 9,375 mc. It weighs about 175 lb. uninstalled. Highlights are:

• **Choice of two beams,** one for mapping and beacon operation, the other for terrain and storm warning.

• **Peak power of 40-50 kw.,** compared with the 10 kw. of the APS-10.

• **Roll and pitch axis** stabilization of the antenna beam to prevent distortion of the scope presentation during airplane maneuvers.

• **Choice of three pulse lengths** and repetition rates for optimum operation under different use conditions, such as land-mapping, weather surveillance, and ground-beacon interrogation.

• **Choice of full or sector scan,** the latter to give better picture clarity during short-range search.

• **Quick-disconnect subassembly** construction to provide easier maintenance by permitting rapid replacement.

► **Long Awaited**—The APS-42 has been a long time coming. The Houston Corp., Los Angeles, bid low and received the production contract in 1947. Today, there are hardly more than a dozen APS-42s installed and in service.

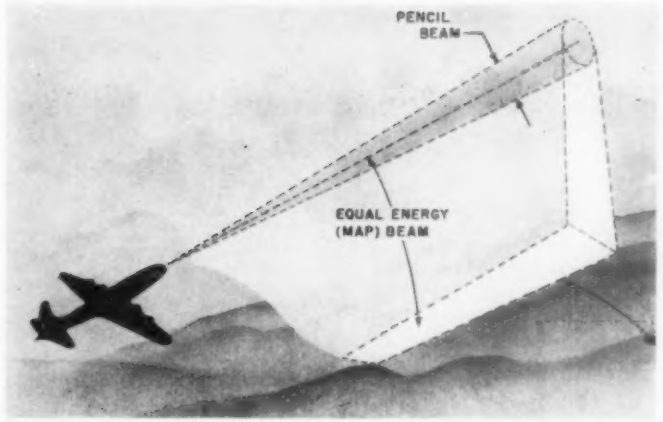
In the interim, the radar has undergone three major redesigns to improve its performance and reliability and to reduce its weight. Several hundred sets are currently being modified to incorporate recent design improvements.

Houston, which had had no previous radar experience, found the APS-42 program considerably more difficult than anticipated. In the summer of 1950, after the Navy had rejected and returned Houston's initial APS-42s, they asked RCA to step in to give technical assistance. Because the program was already late, RCA had to suggest quick fixes rather than consider a more complete redesign.

By the fall of 1951, Houston (which had then become the Houston-Fearless Co.) decided they had had enough and the APS-42 contract was completely transferred to RCA. RCA is now producing the radios in a newly constructed Los Angeles plant.

Special Report

Before the year is out, airlines of the United States are expected to reach the long-awaited decision on plans to install airborne radar. This week the Navy is announcing details on APS-42, a proven type of radar for transport use. These facts perhaps herald a new era in transport operations. To pave the way for an understanding of this era, AVIATION WEEK's Avionics Editor has prepared a series of special reports on airborne radar, of which this is the first.



PENCIL BEAM eliminates ground clutter which is picked up by mapping beam.

▶**The Picture**—Transport radar's claim to fame, and its uniqueness among flight instruments, is its ability to present to the pilot a picture of atmospheric and terrain conditions beneath and around him.

"Radar lessens the mental strain on the pilot because of his psychological sense of 'seeing,'" is the way Sam Saint, former pilot-member of the AA radar project, puts it. Saint now heads Air Transport Assn's Air Navigation and Traffic Control division.

The APS-42 is able to give the pilot a better picture of potentially dangerous terrain and weather than he got from earlier radars. There are several further improvements which were developed too late in the Navy-AA test program to be incorporated in the APS-42.

▶**Two Beams**—The APS-42 presents the pilot with a choice of beam types. This gives the new radar one of its biggest advantages over the old APS-10 in terms of terrain and weather warning. These advantages are best explained in terms of the older fan-shaped beam used for ground mapping and beacon operation on both radars.

When radar is used for ground mapping, earth, water, buildings, etc., are distinguishable from each other largely because of different intensities in their signal return or echo. This requires that roughly equal intensity echos be received from similar objects regardless of their distance from the plane.

This can be accomplished by laying down a uniform electric field intensity along the earth's surface, independent of the distance from the antenna. To provide this equi-intensity illumination, the radar antenna forms a fan-shaped beam whose energy varies as a function of the angle from the horizontal to the ground.

▶**Plan View**—As the APS-42 antenna rotates in azimuth, the radar scope (now called the range-azimuth indicator—RAI) paints a plan view of the terrain illuminated by the radar mapping beam. Roughly 120 deg. of rear hemisphere coverage is blanked out by the fuselage when the antenna is installed in the plane's nose. The plane's position is shown as a small bright dot, called the "main bang," normally located at the center of the RAI.

This ground-mapping fan-shaped beam can be used to search for dangerous terrain and weather by using a remote control to tilt the antenna and its beam skyward. This technique, although used with the APS-10, is not too effective.

Echos from ground terrain can mask or completely hide echoes from clouds located the same distance from the plane. Furthermore, since the radar provides no information on the elevation or altitude of the echoing object, the pilot can't tell whether he'll hit or miss it if he continues at his present flight altitude.

▶**Pencil Beam**—The answer to these problems is the APS-42's thin pencil beam which is usually aimed approximately horizontal or slightly below. The beam illuminates only potentially dangerous objects or precipitation, which means those at or near the plane's own altitude.

Thus the pencil beam largely eliminates echos from low terrain at those times when the pilot is solely interested in seeing potentially dangerous storms or terrain at his flight altitude. Low-level radar energy from side-lobes to the main beam could produce faint "ground clutter" but RCA says the APS-42 beam has acceptably low side-lobes.

If the pilot spots a thunderstorm at his present flight altitude, he can tilt the antenna and its beam to search for storm-free airspace at other altitudes.

The size of the pencil beam produced

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RELAY ND43A & ND43B (A-44-131) also has a totally-enclosed moving element and contact surfaces. "Yellow Dot" approved. 1-3/4" x 1-9/16" x 2-1/16". 24-28 VDC. 5.9 oz. Rated 10 Amp. DPDT NO.

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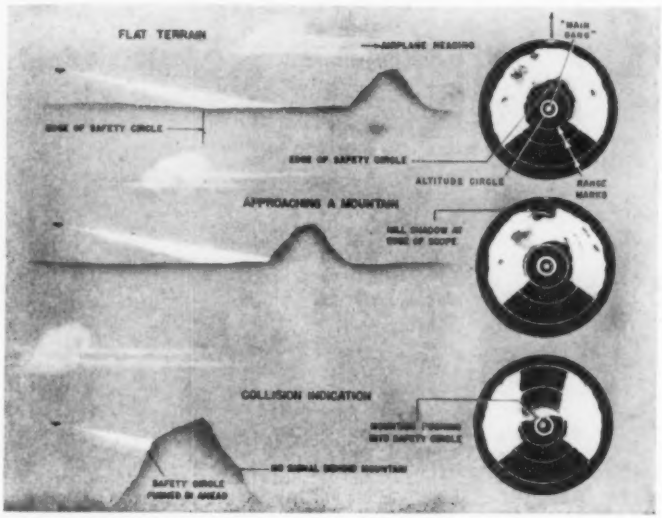


AS PLANE NEARS dangerous terrain, warning shadow first appears topside on radar scope. If no evasive action is taken, terrain echo will invade safety circle.

by the APS-42's 18-in. diameter antenna is about 6 deg. The pilot can switch from this beam to the mapping beam or vice versa using a remote control which rotates the antenna dish 90 deg. about the center of the dish. When the barrel-stave-shaped grid on the antenna dish is in a horizontal position, it deflects energy downward to produce the mapping beam. When the grid is vertical, it has no effect on beam geometry and so produces the pencil beam.

The APS-42's pencil beam gives the radar three major advantages:

- **Ground terrain echoes** which might hide storm echoes are largely eliminated.
- **Radar range is increased** because the energy is concentrated.
- **A safety circle is created** on the RAI which provides positive warning to the pilot when the aircraft is in danger of terrain collision.

▶**The Safety Circle**—When the pencil beam is used, the "main bang" on the RAI is normally surrounded by a dark area of no radar echo, called the "safety circle." This area shows the safe, clear airspace around the plane at or slightly below its altitude (depending upon beam tilt angle). Safe airspace directly ahead of the plane is shown in the 12 o'clock position on the RAI.

Within the safety circle, a small circle is formed by antenna "spill" energy which echoes from the ground directly underneath. The diameter of this "altitude circle" is a rough indication of the plane's height.

Around the safety circle area may lie some ground clutter—echoes from main beam side-lobes. Beyond that are the important radar echoes from main beam illumination.

If these radar echoes come from objects considerably below the plane's altitude, as the plane flies toward them the harmless bright terrain echoes move toward the dark safety circle. When the terrain loses its radar illumination, the terrain echo disappears—merging, so to speak, with the safety circle area.

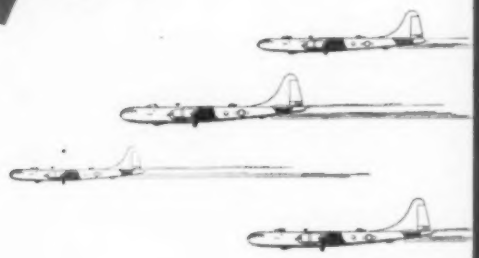
Potentially dangerous terrain at or near the plane's altitude will continue to be illuminated by the main beam as it approaches the plane. Hence, a bright echo will "invade" the dark safety circle area. That is positive warning to the pilot.

From the RAI picture, the pilot can tell whether he can find safe airspace on some other heading at his present altitude. If he must climb out, the RAI will indicate when he has reached a flight altitude sufficient to clear the obstacle. At that point the terrain echo in the 12 o'clock position on the RAI will disappear.

▶**Advance Warning**—A pilot will normally be able to identify mountainous terrain echoes long before they invade the safety circle. Knowing that his is in a mountainous area, he will check the periphery of his RAI periodically for the first appearance of the characteristic "shadow" in a normally bright echo area. The shadow can mean high terrain which is shielding the terrain in back of it from radar energy—hence no echo.

When such a shadow first appears along his flight path, the pilot has at least six or 20 minutes advance warning—depending upon whether the range

The New AC 171



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Among the many features of the new AC-171 is the *exclusive* one-piece insulator — which eliminates the possibility of downward flashover from contact point to ground.

It also facilitates the cleaning of the terminal well, because it eliminates the dirt trap between the core insulator and the shielding barrel insulator.

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THE INDEPENDENCE now uses APS-42.

setting of the radar is 30 or 100 mi. (The 200-mi. range is normally used only for ground beacon interrogation.)

If the pilot were reasonably certain there were no mountains in the area, he would suspect the shadow was a non-echoing lake. But he would proceed cautiously, watching to see if the bright echo in front of the shadow invades his safety circle.

The time available for the pilot to take corrective action after invasion of the safety circle will depend upon the plane's altitude, speed, and the beam's tilt angle. But even under worst conditions, the safety circle provides sufficient time for evasive action.

▶ **Storm Warning**—The radar echo from precipitation is a nuisance in some military radars because it masks small echoes from other aircraft. But this precipitation echo is the basis for radar's use-

'Terrific'

Enthusiasm of MATS pilots for radar is "terrific," Lt. Col. L. J. Hipson, chief of MATS' communication division tells AVIATION WEEK. Hipson is also an Air Force pilot and former airline pilot.

Observers consider this significant as it is based largely on the performance of the old APS-10. But the utility of even the APS-10 for weather surveillance is pointed up by an example Hipson cites. In 1945, Brig. Gen. Haywood Hansell, using the APS-10, picked a smooth fighter path through a "storm" in the Caribbean. Upon landing Hansell learned that he'd flown through a full-fledged hurricane.

Radar is so vital for navigation in Arctic regions, Hipson says, that "no MATS plane is acceptable for Arctic operations unless its radar is functioning."

fulness as a weather prognosticator.

The pencil beam, so effective for terrain warning, is equally useful in storm warning for the same reasons.

The radar echo intensity from precipitation is proportional to the size of the raindrops (6th power of their diameter) and their concentration. Both of these are measures of storm intensity. (The echo intensity is also a function of radar wavelength and beam dimensions, both normally fixed for a particular radar.)

At the fringes of precipitation, where raindrop size is usually small and the drop concentration is light, the RAI shows a light hazy echo fringe around the more solid storm center. To spot heavy precipitation, the pilot adjusts his APS-42 receiver gain so that only the most intense rain areas of the storm show up; he then flies to avoid these storm cores.

▶ **Intensity or Gradient?**—There is some data which indicates that the degree of turbulence in a thunderstorm **isn't** necessarily related to the intensity of rainfall. Rainfall gradient is the real villain causing turbulence, American Airline's later tests led them to conclude, at least tenatively. In an area where rate of change of rainfall rate (gradient) changes rapidly, they found, a plane will usually run into severe turbulence.

Since rainfall gradient is not directly discernible on the radar RAI without much "playing around" with the receiver gain, perhaps the safest practice with the APS-42 is to fly around the storm, if possible. But this isn't always practical, particularly for airliners in terminal areas where converging airlanes prevent much maneuvering. It will be even less feasible in jet transports where fuel consumption is high.

In their Navy tests, AA hit upon a novel method of displaying rainfall gradient on the RAI. If gradient is the important criterion of turbulence, this feature would permit a pilot to pick "soft spots" through a storm instead of flying around it.

The new technique, called iso-echo contouring, was developed too late to go into the APS-42. The military have adopted a "wait and see" attitude as far as backfitting the feature into their APS-42s.

However, the airlines may insist on iso-echo contouring in any radar they buy. Operating details of this new technique will be discussed in the next article in this series.

▶ **Storm or Mountain?**—A problem arises because raindrops absorb considerable radar energy as well as reflecting some of it back to the antenna. Because of this attenuation, the radar beam cannot push through heavy precipitation, and this creates a shadow in back of the bright storm echo.

If the pilot is flying in a mountainous area, and if the precipitation attenuation is heavy, the storm echo in front of the shadow can look like a mountain ridge with its characteristic shadow. If, in addition, the storm has heavy rainfall throughout, giving a solid-looking echo, the pilot may be unable to distinguish a storm from a mountain.

In their Navy tests, AA devised a technique for effectively discriminating between storm echoes and mountain echoes. The method required the normally horizontal polarization of the antenna beam to be momentarily changed to circular polarization. But like iso-echo contouring, this technique came

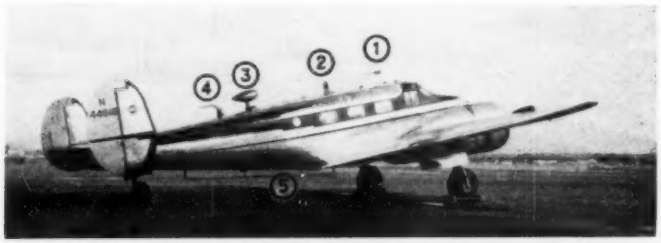
AN/APS-42

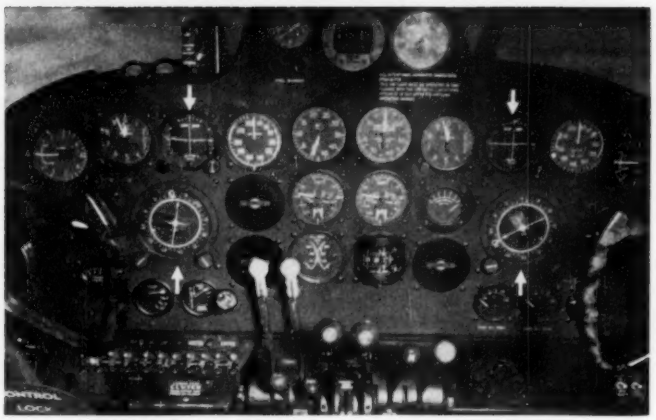
Operating Characteristics

Ranges .... 5, 10, 30, 100, and 200 naut. mi.
Range Markers.....2, 5, and 25 mi.
R-F Operating Frequencies
Transmitting ....9,375 (±55) mc.
Receiving (search).9,375 (±55) mc.
Receiving (beacon) .9,310 (±1) mc.
Peak Power .....50 kw.
Pulse Repetition Rate and Length
Search (5, 10, 30 mi.)
800 pps.*, 0.75 micro-sec.
Search (100, 200 mi.)
200 pps., 3.5 micro-sec.
Weather (all ranges)
200 pps., 3.5 micro-sec.
Beacon (all ranges)
300 pps., 2.25 micro-sec.
(*Pulses per second)
Pencil Beam Dimensions:
Approx. 6 deg. in horizontal plane; 7 deg. in vertical plane, measured between half-power points.
Antenna Scan Rate:

	Full Scan	Sector Scan
5, 10, 30 mi..	40/min.	90/min.
100, 200 mi..	15/min.	35/min.

Weight .....Approx. 175 lb.
Power Consumption
1,000 va., 400 cps., 115 v.; 200 watts, 28 v. d.c.
Indicators (2) .....5-in. CR tubes





COLLINS DEMONSTRATES ITS DEMONSTRATOR

Collins Radio Co.'s Twin Beech demonstrator for new integrated flight system and firm's radio equipment bristles with a variety of antennas: (1) localizer and VOR, (2) VHF communications, (3) radio compass loop, (4) new VHF communications, (5) radio compass "sense" antenna. Hidden is still another antenna, located in the nose for ILS-glideslope. The cockpit has a dual installation of the company's new flight system. Top arrows point to approach horizon which presents airplane attitude and complete information needed for an ILS approach. Lower arrows point to course indicator which displays magnetic heading and a pictorial presentation of plane position.

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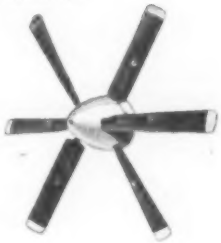

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too late for the APS-42.

Here is another feature which the airlines will probably want in any radar they buy. It will be discussed in more detail in the next article in this series.

▶ **Behind The Storm**—The strong attenuation of radar energy by rain raises the dangerous prospect that a mountain may be lurking behind a thunderstorm without giving a warning echo on the RAI. A partial solution to this problem is to increase radar power.

The peak power of 40-50 kw. used in the APS-42 is a four-fold increase over the old APS-10. This should increase clear-weather range by about 40%. How much it improves the APS-42's storm penetration abilities remains to be seen.

▶ **Beam Stabilization**—Roll and pitch axis stabilization of the APS-42 beam represents a considerable advance over the unstabilized APS-10. Of the two axes, roll stabilization is the more important, particularly for ground mapping and beacon navigation.

Without stabilization, the RAI picture becomes unintelligible when the airplane banks for a turn, skewing the beam proportionately. With stabilization, the pilot can monitor his turn by watching the RAI and know exactly when to level out.

In the APS-42, roll axis stabilization of the beam is achieved by physically rotating the antenna dish and its waveguide through an angle proportional to the plane's bank angle.

Pitch stabilization is a more debatable feature. It takes out momentary pitching movements of the plane without displacing the beam. But pitch stabilization is not absolutely necessary to correct for long-period changes in the plane's pitch angle. The antenna tilt control can be used manually to adjust the beam pitch angle.

In the APS-42 design, where roll stabilization is required, the pitch stabilization adds little in the way of cost or complexity.

▶ **New Suppliers**—With APS-42 installations planned for all four-engine military transports, Bendix Aviation's Pacific division and Allen B. DuMont Laboratories are setting up to produce the new radar. The Navy buys all APS-42s used by the military, although the Air Force gets most of the sets.

DuMont supplies the Navy with APS-42Bs and Bendix supplies the USAF with APS-42As, with RCA turning out APS-42s for the USAF. The Bendix and DuMont units have slightly different internal "packaging" and layout from the RCA sets. However, major assemblies, such as the antenna, synchronizer unit, etc., are operationally interchangeable, regardless of the manufacturer.

RCA expects that the current redesign, in production since April, will give the performance and reliability the military have been seeking. Certainly the design will have benefited from the considerable field experience obtained in service tests of a dozen of the earlier versions.

A "new school" of thinking among airline radar experts rejects the APS-42 as unsuited for airline use. Their reasons, and the characteristics of the new airline radar they want will be discussed in next week's article.

For VIPs

Maj. L. C. Hanson who flies Gen. Vandenberg and other VIPs in a MATS Constellation equipped with the APS-10 is a radar supporter. He tells AVIATION WEEK that "we can go right through line squalls with hardly any turbulence."

Major Hanson and his navigator, Capt. Jack Heshishian, who operates the APS-10, praised its navigational usefulness in areas where the terrain is dangerous and radio aids are not reliable. Approaching Athens, Greece, from the west with high mountains on either side of the Gulf of Patras and Corinth, Hanson says, "we can make a confident straight-in let-down using our radar."

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DOUGLAS DC-6A's 28,000-lb. capacity helps build Slick Airways' business as . . .

BIG LOADING DOORS make shipment of heavier and bulkier freight easier.

DC-6As Boost Slick Cargo Volume

Carrier now flying more and more heavy machinery as each new freighter ups business 600,000 ton miles.

By George L. Christian

Burbank, Calif.—The Douglas DC-6A is slowly but surely changing the character of Slick Airways' freight operation. Large and heavy shipments, including machinery, are providing an increasing share of the carrier's business, shifting the emphasis from flowers and clothing.

The growing diversification of cargo, the new customers and new markets will help stabilize its business, Slick feels, reducing seasonal freight fluctuations.

Reason for the change is the performance of this first designed-for-the-purpose air freighter to see service in the U. S. Its 28,000-lb. capacity and large loading doors make the handling of heavy, bulky equipment feasible. In addition, it offers greater speed, long range, and controlled temperatures and pressures in the cabin.

▶ **Big Shift**—Impact of the DC-6A on the carrier's overall business is indicated by the fact that Slick's cargo business has climbed about 600,000 ton miles with the addition of each of its three DC-6As. Three more of the freighters will be delivered in the first quarter of 1953.

How the new plane is changing the nature of Slick's shipments may be gathered from this:

• **Flowers** and other lightweight commodities now make up only 25% of the company's eastbound business, where they used to represent 50%. (But the total volume of flowers carried has gone up.)

• **Heavy machinery**, electronic equipment, pharmaceuticals and machine parts have displaced clothing from first place in westbound shipments.

Slick says much heavy machinery can be shipped safely by air without heavy and expensive shipping crates. Thus a customer often may get the advantage of airfreight's speed at a lower cost than he would pay for ground transportation.

▶ **Big Pack**—Slick officials claim to have carried the heaviest single airshipment ever. They stuffed a 32-ft. tie rod weighing 25,000 lb. in a -6A and hauled it from Philadelphia to Burbank overnight with one stop in Kansas City.

And Slick points out that increased takeoff weights soon to be allowed for the four-engine freighter will extend the ship's capabilities. A maximum gross takeoff weight increase from 100,000 lb. to 102,800 will be allowable with the R2800CB16 engines as soon as the existing (but to date inoperative) reversible propellers are put into use. A further increase to 107,000 lb. is expected when the engines are used as -CB17s (this simply means using a fuel of 108 octane rating or better without any modification to the engines). Result of such increases in takeoff weight will be that Slick can operate Burbank-Chicago or return nonstop, over-flying Kansas City.

(The first DC-6A delivered to Slick is restricted to 100,000 lb. because of structural considerations.)

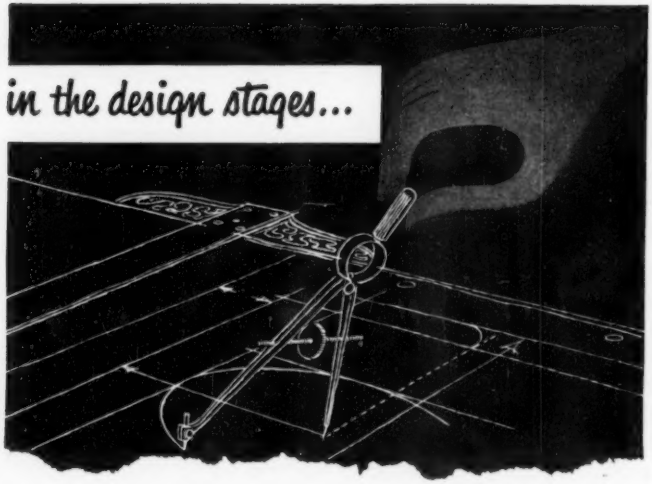
Index of why the plane is so popular with Slick is this performance, which Slick thinks is a record: from May to October, 1951, and with a limited supply of spares, the airline completed all scheduled coast-to-coast trips without missing one. The schedule was three roundtrips a week.

▶ **Around the Shop**—A tour of Slick's main overhaul facilities in Burbank reveals many interesting facets of a freight airline's operations and the ingenious ways some problems are licked.

• **Crash net.** Crews need maximum protection when a freighter crash-lands. In case of sudden stoppage, heavy cargo can tear loose from its tie-downs, crush through the forward bulkhead and into the flight crew. Slick's way of preventing this is to install a crash net against the rear face of the bulkhead at Station 122.

Steel cables radiate inward from about twenty attachment points around the fuselage and attach to a central heavy steel ring about 15 in. in diameter. Four concentric circles of heavy webbing complete the structure.

The crash net, stressed for a 30,000-lb. load at 6G, will cushion forward-



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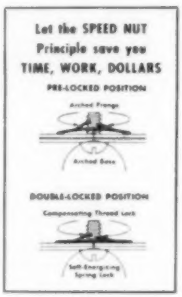

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Width in Inches	Height in Inches: 60 & Less	65	68	70	72	78	79
3	623	623	620	612	547	472	412
6	623	623	605	581	521	449	393
12	602	565	504	472	432	387	354
18	484	435	406	384	361	330	302
24	398	363	339	326	319	291	271
36	290	276	263	249	235	224	213
48	234	223	211	204	196	185	175
60	189	178	173	170	168	158	149
72	163	151	146	143	141	136	130
84	141	128	125	123	120		
96	124	113					
103	115						

SIZE OF CARGO Slick's DC-6As can handle is given by this cross-reading table.

sliding load, then cinch in the fuselage at cable attachment points before allowing cargo to move into the cockpit. The fuselage will break, but the crew stands a good chance of walking away.

Also, Slick loads its cargo right up to the forward bulkhead, to prevent load from getting a "running start" in case of sudden stops.

• **Door sills.** Loading heavy cargo into the DC-6s caused damage to the door sills. This is serious in a DC-6A because it is pressurized and any substantial damage creates cabin pressurization leakage. At maximum cabin pressure differential, 19.5 tons pushes against the doors.

So Slick engineers devised a sill protector consisting of two ¾-in. plywood boards mounted at right angles to a heavy aluminum flange running the full length of each door. The sill protectors are hinged to fold out and down, guarding the side of the fuselage from fork lift and tractor during loading, then folding into the fuselage so doors can close tightly. The airline thinks it is a simple but strong method of protection.

• **Floor worry.** In common with other freight carriers, Slick needs strong but lightweight floors. Heavy cargo tears up even the best flooring material. "Not that the original floors did not do what Douglas said they would do," said a Slick engineer, "but we simply have to have sturdier floors without an unreasonable weight penalty."

First flooring tried was a paper laminate cemented to aluminum, like linoleum. The laminate gave good abrasion resistance, but the floor was not stiff enough and deflected under load. So the laminate cracked and broke up.

Plywood floors ¾ in. thick were tried but splintered. Replaced with ½-in. plywood, they hold up. But the weight penalty is about 850 lb. per plane.

• **Interior lining.** The inside of the fuselage now is lined with a fiber glass laminate called "V" board. It gives good service and is quite puncture-resistant. But it weighs a lot. Slick could save 650-700 lb. by using it only up to window level to protect the fuse-

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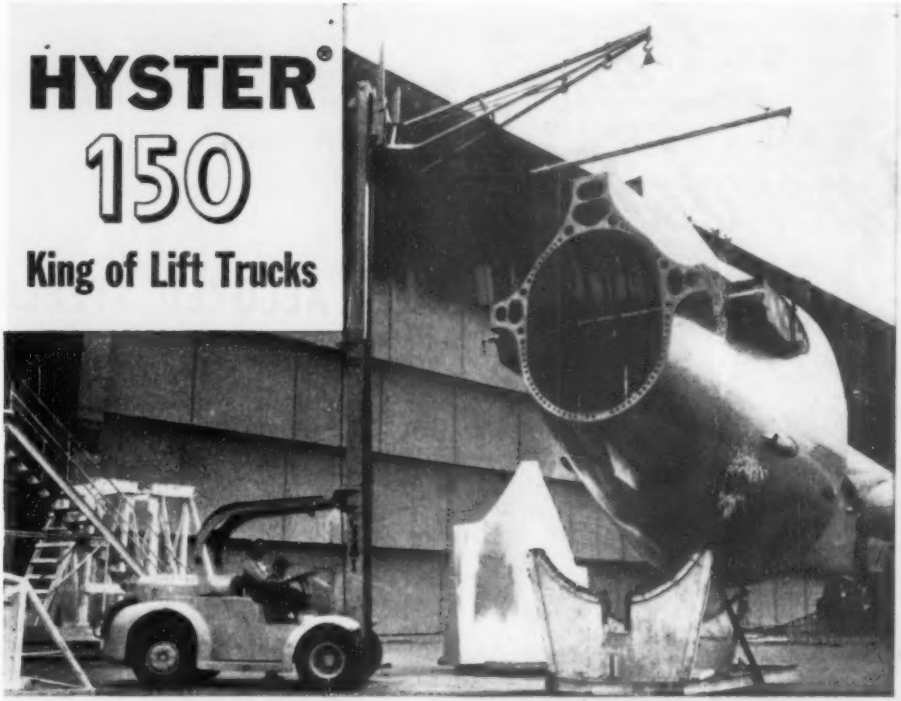

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PIASECKI USES NICKEL ALLOYED STEELS

(A) This HUP-1 type helicopter is a product of Piasecki Helicopter Corp., Morton, Pa. A leader in the development and manufacture of helicopters, Piasecki is now building the world's largest craft of this type, designated the XH-16 by the U. S. Air Force.

(B) Forged nickel alloy steel rotor hub and spar tubes of a Piasecki helicopter. Nickel alloy steels, heat treated to provide an optimum combination of strength, toughness and wear-resistance, are used for these and other major components.

The good performance of Piasecki Helicopters attests to the dependability of nickel alloyed steels for transmission shafts, rotor hubs, spar tubes, drive shafts and other vital parts.

Type 4340 nickel-chromium-molybdenum steel, having 180,000 p.s.i. minimum tensile strength, is used for some 90 per cent of the forged components as well as for many parts fabricated from bar stock.

Transmission gears are made from type 3312 steel (3½% nickel–1½% chromium) to assure a strong, tough core along with a hard, wear-resistant case after hardening.

Practically all bolts for these craft are type 2330 steel containing 3½% nickel, heat treated to provide 125,000 p.s.i. minimum strength with toughness.

Fire walls, oil tanks, exhaust collectors and allied parts that must combat corrosion and heat utilize A.I.S.I. Types 302, 321, or 347 stainless chromium-nickel steels.

Also, in producing the Continental R-975-34 and the Wright Cyclone R-1820-76A...engines that power Piasecki helicopters...it is common practice to use crankshafts, connecting rods, gears, bolts, studs and various other parts made from heat treated nickel alloy steels, for maximum assurance of safety and dependability.

At the present time, the bulk of the nickel produced is being diverted to defense. Through application to appropriate authorities, nickel is obtainable for the production of engineering alloy steels for many end uses in defense and defense supporting industries.

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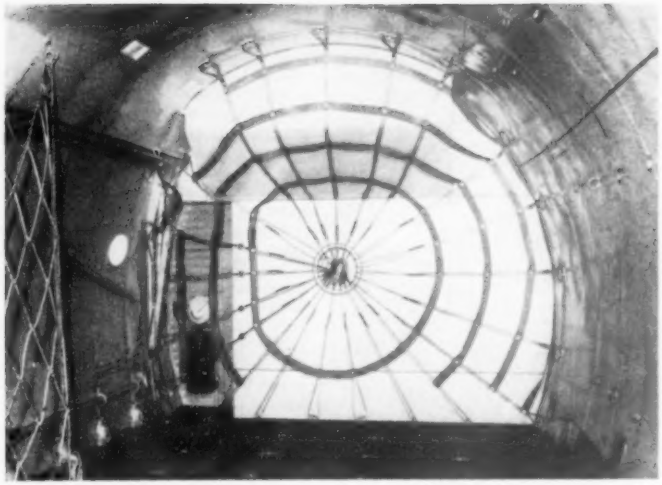

CRASH NET is designed to protect crews from forward-sliding heavy cargo.

lage sides, and replacing it across the top of the cabin with lighter stuff. Problem is that "V" board serves as fuselage reinforcement and removing it may reduce permissible maximum loads on cabin side cargo tie-down rings by as much as 75%, according to Slick engineers.

▶ **Austere Aircraft.** Slick is out to trim every pound of excess weight off its DC-6As and make every cubic foot of space available for cargo.

Propeller synchronizers are nice for passenger planes where prop beat can annoy passengers. We don't need them on cargo craft, says Slick. So off they come, and 38 lb. plus $2,800 will be saved on each of the soon-to-be-delivered -6As.

Toilet facilities are simple and compact; flights are not extremely long.

Forward bulkhead has been squeezed as close to the cockpit as possible to give completely unobstructed cargo area to rear pressure bulkhead.

Floor attachment grid pattern is laid out so seats may be installed if required.

Escape ropes are stowed in the fuselage above the doors and emergency exits. Red cloth tags identify them.

▶ **In the Cockpit**—The only difference between the DC-6A cockpit and that in passenger -6s is that here the cabin temperature control panel is installed above the co-pilot.

Gyro flight instruments are all-electric, except for one vacuum-driven turn and bank indicator. Pilot has one of each, co-pilot one electric indicator.

Instrument flying aids for the pilot include the Bendix Omnimag MN-97. Slick officials say pilots' reaction to the Omnimag is enthusiastic. Co-pilot has standard cross pointer indicator.

The Sperry A-12 autopilot is installed in the DC-6As. Slick engineers express the opinion that the A-12 is slightly more flexible than other autopilots. And they like the directional portion of the equipment—the Gyrosyn compass.

▶ **Plane Talk**—C. F. Poizet, long a pilot for Slick and now assistant to the president, T. L. Grace, told AVIATION WEEK that the DC-6A, basically, has posed no problems to his company. Total hours accumulated on the fleet to date are approximately 6,100. The airframe and most of the systems, including hydraulic, pressurization, landing gear and wing flaps, have given little or no trouble. The electrical system has caused some concern, he added, and this is sometimes reflected in instrument operation.

• Monsanto Chemical's Skydrol nonflammable hydraulic fluid is used in both the cabin supercharger drive and main hydraulic systems. Slick maintenance personnel are happy about its performance. Hydraulic pump life is increased because of the fluid's excellent lubricity and leakage problems are negligible, they say. Nor have any operational squawks been registered. Poizet says he "flew the line for six months and wrote up only one minor brake leak." One annoyance attributable to Skydrol, according to Slick, is its paint-removing quality.

• Pilots like the Sperry automatic approach coupler that ties the A-12 autopilot to the ILS localizer and glide path beams. There is some concern, however, that airport minimums may be raised because of recent accidents. The utility of automatic approach couplers diminishes with rising minimums.

• Slick is testing Thompson Aircraft Tire Corp.'s slotted tread recap tire. Although it is too early to express a firm opinion, preliminary indications are that the tire will give longer life.

• Gordon Brown cargo netting and web locks used in the DC-6As are giving quite good service, the airline reports.

• The entire fleet of DC-6As and C-46s is being wired for the Scintilla ignition analyzer. The C-46s will use the instrument as a portable unit; in the -6As it may also be used as an airborne unit.

• Oil radiators on the C-46s are being changed to Clifford equipment. Reasons cited by the carrier's maintenance personnel are that the Clifford cooler is light, inexpensive, and easy to repair and maintain.

• Ceramic exhaust stack coating is being tested on one DC-6A and two C-46s. F. C. Thomas, Slick's maintenance manager, believes that the coating will at least double stack life.

• Jack and Heintz JH6BESR12 starters, incorporating keyhole mounting brackets, save mechanics' time during installation or removal from the engine accessory section. Attachment nuts may simply be loosened instead of removed, making the operation easier and quicker.

• Aeroquip hoses exclusively are used in the C-46 powerplant accessory section, except for Everdur vacuum drain and engine overboard vent lines. Slick says this configuration is trouble-free and lends desirable safety qualities.

• A Slick-developed CO_2 release system in C-46 powerplants saves 35% of cylinder removal time because "jugs" can be pulled without disturbing the CO_2 setup. The extinguishant is released more rapidly—4 sec. instead of 5. The layout consists of a ¾-in. line circling the engine between the rear row of cylinders and the fire seal. Nine ¼-in. lines take off from the circle and carry the CO_2 forward between the cylinders.

• To allow quick and correct cabin supercharger drive shaft alignment when installing outboard engines on the DC-6A, Slick designed 8-in. guide pins. Used on the lower engine trunnions, the pins allow the engine to be mounted while keeping the supercharger drive shaft properly aligned.

▶ **Slick Solutions**—Here is how Slick has worked out some of its maintenance problems:

• Jack and Heintz inverters on DC-6As overheated and failed, as did the electric blowers designed to cool the units. This raised hob with electric instruments. Installation of a Douglas supersonic venturi has helped to keep the inverters' temperature down and cool the radio racks besides.

• Cylinder failure has been the biggest headache on the DC-6A engines. Some 43 jugs have been changed on

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the fleet to date. Most were due to exhaust valve and exhaust valve guide failures. Slick operates its -CB16 engines at 1,150 hp. until fuel consumed brings the plane's weight down to 92,500 lb. Power is then reduced to 1,100 hp. for the remainder of the flight, Slick says. Average true air speed at these powers is 285-290 mph.

Another nuisance associated with the engine installation is frequent cracking of oil cooler and carburetor air intake scoops.

Two C-46 engine problems have been licked by Slick.

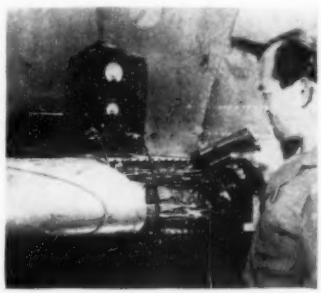
• Blower case leaks were stopped by using an R2800CA engine Neoprene seal and No. 3 Aviation Permatex sealant.

• Corrosion and wear of General Electric magneto breaker point cams caused excessive wear on the cam follower. Remedy was to polish cam with diamond dust and flash-chromeplate the cam.

Though Slick's main overhaul base is here in Burbank, it still maintains its engine overhaul shops in Texas. That facility turns out 45 R2800-75s a month, 30 of its own, ten for the Flying Tigers and five for Civil Air Transport of Formosa. A substantial number of USAF R1300s also go through the shop.

United Airlines overhauls the carrier's DC-6A engines at the moment.

Aircraft utilization in the last year went from 7.8 to 8.3 hr. Miles flown jumped 30% to 12,780,115. Maintenance costs were substantially reduced by stretching by 10% the number of hours flown by all aircraft between periodic maintenance checks.



SPOTS FUEL SYSTEM LEAKS

This portable pistol-type device, originally developed by General Electric to detect leaks in refrigeration systems, is being used by North American Aviation, Los Angeles, to check aircraft fuel cells for leaks. It is designed to discover openings so tiny that only 1/400 oz. of air would escape in a year. It is sensitive to halogens, which NAA engineers inject in the airplane's empty fuel system and then maintain under a specific pressure. The GE device is then run over the system.

Airport Fire Control Techniques Studied

Airport fire-fighting techniques that enable fire crews to work their way into blazing plane wrecks and bring out survivors highlighted the aviation safety discussions during the recent 22d annual Greater New York Safety Convention.

Capt. James Kelly, Port of New York Authority, showed a color film depicting PNYA fire crews at Idlewild International Airport going through one of their drills—the drills cost the Authority approximately $25,000 annually.

PNYA has a specially built fire truck (Walters FFCD chassis and Maxim body) and "nurse" unit which can provide approximately 30,000 gal. of foam blanket. Also available is an 800-lb. high-pressure carbon dioxide system.

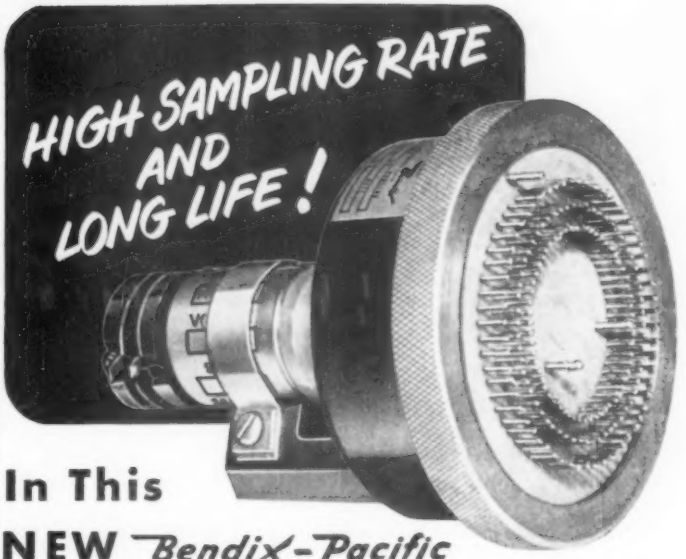
PNYA crews are trained not to waste time trying to quench the entire blaze—instead cut a foam swath to the cabin in a matter of seconds, permitting them to enter and rescue occupants. Saving the aircraft is a secondary consideration. The trick is to lay down sufficient material to douse flame without wasting time piling it on too thickly.

Some graphic examples of how workers saved eyesight by wearing prescribed safety glasses and avoided serious foot injuries by wearing safety shoes were shown in a series of slides made by Grumman Aircraft Engineering Corp., Bethpage, N. Y. Grumman Safety Director Robert Moore stressed need for grounding aircraft during fueling operations.

Stewardess's responsibility for detecting and rapidly making correct diagnosis of sudden attacks of illness among her passengers was covered by Miss Ann Flack, assistant supervisor of stewardess service for American Airlines' system.

"How will we explain this? The manifest says only TWO of them!"

Republic Aviation News



In This

NEW Bendix-Pacific

TELEMETERING COMMUTATING SWITCH

Commutation of telemetering subcarrier oscillator input voltages or pickup output at high sampling rates can now be provided with this new Bendix-Pacific TSC-18 Commutating Switch.

The TSC-18 Commutating Switch is a three pole switch having 60 contacts per section and shorting type contact wipers. Non-shorting type operation may be obtained by connecting to alternate contacts giving 30 circuits in each section with 60% duty cycle. The wipers are adjustable for synchronization of all sections.

Long life has been engineered into the switch through the use of heat treated precious metal contact pins and wipers. The contact plate and rotor are completely enclosed in an aluminum housing which is attached to a small permanent magnet motor having an integral gear train and governor.

SPECIFICATIONS

Motor Voltages: 6, 12, or 28 volts DC.
Motor Current: 300 to 500 ma.
Capacities: Adjacent pins: 2.8 mmfd.
Alternate pins: 2.2 mmfd.
Inner to middle slip ring: 19.2 mmfd.
Outer to middle slip ring: 18.3 mmfd.
Outer to inner slip ring: 16.7 mmfd.
Temperature range: −50°C to +100°C
Acceleration: Satisfactory to 40 G along any axis
Vibration: Satisfactory to 20 G at a frequency of 55 cps or 10 G to 600 cps along any axis
Dimensions: 3.5" max. diameter; 4.98" max. length
Weight: 1.18 pounds

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TO MEASURE..TO WARN..TO INDICATE..AT A DISTANCE

CROSS-OVER EXHAUST stacks (arrows) give TCA passengers a quieter ride.

TCA Cuts Noise on its North Stars

Carrier reworks engine exhaust system to produce a quieter plane; entire DC-4M fleet to get treatment.

By Henry Lefer

Montreal—Trans-Canada Airlines is going after its share of the growing air travel market with a reworked, quieter North Star. The redesigned DC-4M also seats eight more passengers—a total of 48—at no sacrifice in comfort (AVIATION WEEK Apr. 28, p. 17).

Right now the first of the new models is flying on the New York-Montreal run, but as the remainder of TCA's 23-plane North Star fleet gets the sound-plus-seating treatment, the transports will go into service on all of the carrier's four-engine routes, including the Atlantic coach service.

Development of the noise-cutting system has cost TCA over a quarter of a million dollars to date, and will cost at least that much again before fleet-wide installation is completed in September.

► **Noisy Star**—TCA has long been aware of the noise problem on its Canadair North Star fleet. Customer complaints would not let the airline forget it, even if the company had been so inclined. The liquid-cooled Rolls-Royce 620s, which deliver 1,740 hp. each to the four-engine transport, dump part of their exhaust on the inboard side where it impinges on the cabin, making for a loud and at times uncomfortable ride.

But TCA wanted to stick with the 620—a civilian adaptation of the wartime Merlin—because of its faith in the engine's reliability and the belief that a liquid-cooled powerplant was best suited to the carrier's operations through extremes of temperature.

So efforts were directed to quieting, rather than replacing it.

The solution—a cross-over exhaust system to direct the engine blast away from the cabin—has cut the noise level at least 50% in the prototype installation, which has now racked up 400 hr.

The noise reduction ranges from 6 decibels overall to 15 decibels in the speech frequencies. The difference between the standard DC-4M and the plane equipped with the new system is readily apparent to the passengers. Conversation is easily carried on in normal tones in the reworked North Star.

► **Not Easy**—Solution of the noise problem seems simple, but it wasn't, according to J. T. Dyment, TCA's director of engineering. Work began back in 1948, with Rolls-Royce and Canadair, among others, taking a crack at it. Merlin W. "Mac" MacCleod, the airline's supervisor of job methods and development, finally hammered out the present system by hand.

Among the difficulties to be overcome were the high temperature of the exhaust gas (close to the manifold's critical temperature of 1650F); the 250-mph. velocity of the exhaust; pulsation; and necessity of matching expansion and contraction rates of engine and manifold. Early designs which managed to get the noise down could not stand up structurally. Industry opinion was that the problem was probably impossible of solution, but Trans-Canada decided to continue with the work.

MacCleod's design increases the size of the ducting carrying the cross-over exhaust. Previous tries had specified the same size as in air-cooled engines, to take advantage of ejector thrust. While the larger size loses this thrust, it makes up for it in a quieter noise level and reduced exhaust temperature. The new system keeps the exhaust about 800F (at cruise) to 600F (at takeoff) below the manifold's critical temperature.

The new stacks will cost 30% more than the old type, but TCA expects to be paid back, not only in improved passenger comfort and a better competitive position, but through reduced maintenance.

► **High Performance**—The weight penalty attached to the new system is 73 lb. per engine—fairly low compared with the Merlin engine's overall weight of 3,600 lb.—and this is overcome through improved performance of the redesigned cowling. Speeds of the quieter North Star and the standard planes are just about even.

Although the new installation is more complicated than the old style exhaust stacks, accessibility to engine units has not been much changed.

While the prototype set of four exhaust assemblies was turned out by MacCleod himself, TCA has contracted with Canadair for production sets to equip the remainder of the carrier's 23 North Stars. In addition, the Royal Canadian Air Force and British Overseas Airways Corp. have shown an interest in the noise muffler. Trans-Canada hopes that outside sales will help pay back part of the development cost of the unit.

► **More Seats**—The prototype installation is flying in TCA's new 48-seat high-density North Star. The gain of eight seats has come from moving the men's room to the rear, where it adjoins the ladies' room; eliminating the ladies' lounge; transplanting the coat room up front, behind the cockpit, from its usual spot opposite the passenger entrance. The reshuffling has actually resulted in more room between rows.

The new seating arrangement provides 13 rows of double seats down the starboard side of the plane; seven rows forward of the entrance and galley on the port side; and four, including a rearward facing pair of seats, aft of the galley.

Lightplane VHF Transmitter

A new small VHF transmitter for utility plane radio transmission to control towers or range stations has been developed by Air Communications Co. Weighing only 2¼ lb., the new unit must be used in conjunction with a LF radio receiver.

The manufacturer claims frequency stability of ± 0.01% for the six crystal-controlled channels which operate between 122.1 mc and 122.9 mc. At favorable altitudes, the unit is said to have a range of 75 mi.

Air Communications Co., 23 Main St., Hackensack, N. J.

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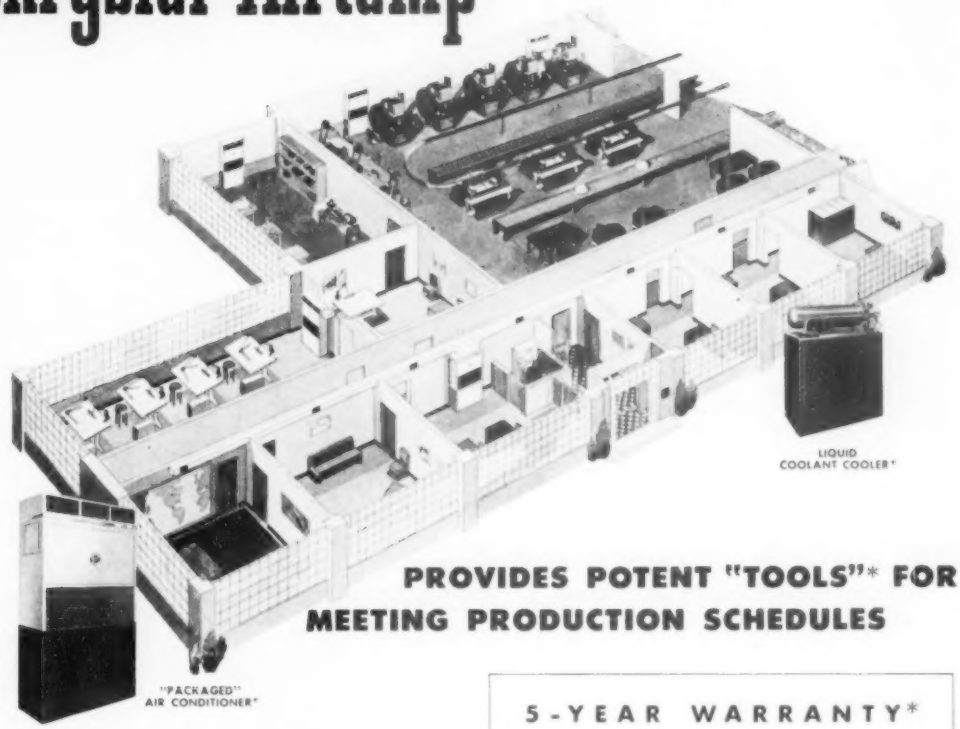

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In bad weather the pilot sees more lights and sees them sooner with this system.

CROUSE-HINDS offers all 3 types of high intensity runway lights

Each of the other two systems of high intensity lighting has its individual advantages.

Type HRL is a fixed focus bi-directional unit. It uses a 200-watt lamp in an optical prismatic Pyrex globe. It is approved by CAA under Specification L-819.

This system has the lowest installation cost, making it practical for non-instrument runways, as well as instrument runways.

Type HSL is a fixed focus uni-directional unit. It has a cast aluminum housing with two 95-watt sealed beam high intensity lamps inside and a 30-watt medium intensity light on top. Each of three lamps can be switched separately from the tower. It provides a main beam in only one direction, without the background haze resulting from the "back beam". It is approved by CAA under Specification L-820.

This system is the most economical to operate.

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Send for Bulletin 358-F. It contains an impartial comparison of the three systems and estimated installation costs of each.

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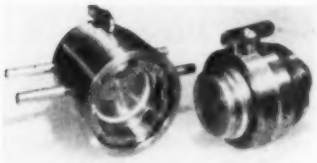

Rocket Fuel Coupling

Light Couplings for Missiles, Planes

Two new couplings for aircraft and missile applications have been introduced by E. B. Wiggins Oil Tool Co., Inc.

One is a flexible coupling primarily intended for aircraft fuel and oil systems. This is a lightweight part of small diameter. The coupling can be installed after tubes are in place. This avoids need for large cutouts in structures through which the hose is routed. The coupling permits misalignments up to 3 deg. and separation of tube ends by as much as ¼ in. without leaking. For pressures in excess of 375 psi and temperatures from −65 to 460F, the new coupling promises to be the answer in many cases where vibration and flexure on rigid tubing creates a connection problem, the company feels.

The second coupling announced by the firm, for missile and rocket applications, is an interesting type having self-closing valves in each half. This part is designed to prevent spillage of dangerous, corrosive fluids used in rockets when supply lines carrying them are disconnected. The coupling, in addition, keeps air from getting into the system.

As an added precaution, the coupling cannot be disconnected until the shut-off valves have been manually turned by means of the handles provided externally on the unit.

Made of stainless steel, the part will withstand temperatures from −65F to 400F. Those currently in production fit ¾- and 1¼-in. pipe sizes.

E. B. Wiggins Oil Tool Co., Inc., 3424 E. Olympic Blvd., Los Angeles 23, Calif.

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Model 446 transmitter operates on 4 crystal-controlled frequencies (plus 2 closely spaced frequencies) in the band 2.5-13.5 Mcs (1.6-2.5 Mcs available). Operates on one frequency at a time, changing time 2 seconds. Carrier power 250 watts. A1 or A3 AM. Stability .003% using CR-7 or HC-6/U crystals. Operates in ambient 0° to + 45° C using mercury rectifiers. -55° to + 45° C using gas filled rectifiers. Power supply, 200/250 volts, 50/60 cycles, single phase. Conservatively rated. Ruggedly constructed. Complete technical data on request.
Here's the ideal general-purpose high-frequency transmitter! Model 446 . . . 4-channel, 6-frequency, medium power, high stability. Suitable for point-to-point or ground-to-air communication. Can be remotely located from operating position. Co-axial fitting to accept frequency shift signals.
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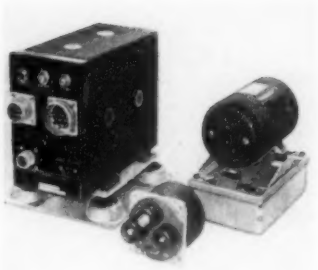

Beacon Receiver

A new aircraft marker-beacon receiver weighing only 7 lb. has been developed by Flite-Tronics, Inc. The new receiver, the MB-3, will operate with either tone or voice modulated marker beacons operating on the 75-mc carrier frequency.

The new receiver provides both aural and visual indication for each of the three modulation tone frequencies of 400, 1,300, and 3,000 cps. It operates from either 12- or 24-volt systems, and with regular VHF antennas of 50 ohms impedance.

The individual sensitivity of the high and low sensitivity ranges is adjustable. The manufacturer says the MB-3 meets specification AN-E-19.

Flite-Tronics, Inc., Burbank, California.

WHAT'S NEW

New Books

The Timing of Airport Traffic Control as Influenced by Weather and Aircraft Performance, No. 4 in the Garbell Aeronautical Series, 402 pages, including 134 pages of figures, graphs and charts, available from the Garbell Research Foundation, 1714 Lake St., San Francisco 21, Calif.

This study provides information necessary to calculate accurately the time interval between airport traffic movements for any given airport geometry, aircraft type and weather conditions. The big San Francisco Airport is used for a numerical example to illustrate in every detail the analyses involved.

The investigation started out primarily as meteorological study contrast undertaken by Garbell for the Weather Bureau, sponsored by the Air Navigation Development Board. As the study progressed it became apparent that the effects of weather and aircraft performance on air traffic control timing were an inseparable combination and Garbell sponsored an additional analysis

of aircraft performance. Planes covered are the DC-3, DC-4, DC-6, L-049/149, L-649/749, CV-240 and Boeing Stratocruiser. The detailed charts, for example, permit calculation of each aircraft's ground-run distances, runway surface friction coefficients and ultimate taxi speeds after landing.

Telling the Market

Catalog 40 provides specifications and other design data on **V-Band couplings.** Write Marman Products Co., Inc., Inglewood, Calif. . . . Bulletin 1458A describes interesting **universal single spindle high-speed gear hobber,** gives specifications. Write Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

Catalog R-200 provides engineering data on **Roylyn couplings and other aircraft hardware.** Write Roylyn, Inc., Glendale, Calif. . . . Data concerning proper application of **Thermoswitch thermostats** to heat control problems is given in 52-page Catalog 400 available from Fenwal, Inc., Ashland, Mass. . . . **High Quality Castings for Industry** is 12-page booklet telling about Atlantalloy plaster mold casting process which offers certain production economies. Atlantic Casting & Engineering Corp., 721 Bloomfield Ave., Clifton 1, N. J.

First production units of new line of **miniature transformers and reactors** developed by Southwestern Industrial Electronics Co., are described in folder. Write the company at 2831 Post Oak Rd., P. O. Box 13058, Houston 19, Tex. . . . Late information on **aircraft Micarta pulleys,** including cross-sectioned diagrams of 11AN pulleys, which glow no longer than 10 sec. after flames are extinguished, is contained in seven-page Booklet B-4351 available from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

Publications Received

- **The Aircraft Year Book for 1951,** official publication of the Aircraft Industries Association of America, Inc., edited & published by Lincoln Press, Inc., 511 11th St., N. W., Washington 4, D. C. $6.00. In addition to reporting on the problems of aircraft production, the 1951 Aircraft Year Book provides a report on the activities of the military services and a full report on our commercial airlines.
- **Principles of Air Navigation,** by E. W. Anderson, published by Methuen & Co., Ltd., 36 Essex St., Strand, W. C. 2, London, 1951, $3.50. This comprehensive textbook of modern air navigation introduces new equipments, methods and ideas, written in a simple and readable form by a highly qualified navigator in the Royal Air Force.
- **White's Air Directory and Who's Who in New Zealand Aviation** (including the South Pacific), published by Aircraft Supplies, Ltd., New Zealand.

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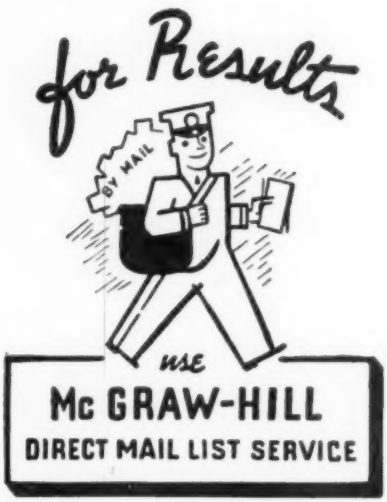

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Some Things Are WORSE THAN STRIKES

This editorial which appears in McGraw-Hill publications was written just prior to the resignation of Charles E. Wilson as Director of Mobilization. The principle it discusses is of basic and continuing importance in our struggle to maintain economic and personal freedom in America.

It is to be hoped that the managements of the steel industry will resolutely resist the efforts of the national Wage Stabilization Board to force them to establish the union shop in their plants. In essence, the union shop means compulsory union membership.

They should resist not because of any financial advantage to the owners of the industry. There would be none. They should resist out of a decent regard for those ideals of our country which we are now fighting in Korea to protect. Moreover, their resistance would, as a matter of fact, benefit the leaders of the organized steel workers by protecting them from the certain and bitter fruits of their "victory" in getting the government to impose the union shop on the steel industry. Their successful resistance would also prevent Premier Stalin and his co-workers from enjoying a hearty laugh at our expense.

Fun for the Russians

This is why the Politburo would find the establishment of the union shop in the steel industry, at the behest of the Wage Stabilization Board, so profoundly amusing. We are fighting in Korea because we believe that armed aggression, promoted by Russia, menaces our freedom. And we are spending hundreds of billions of dollars here at home for armament to protect our freedom at other danger points. When this rearmament program is threatened by a crippling strike, the federal government through its Wage Stabilization Board proposes to buy off the threat by plowing under a vital element of that freedom which we are trying so desperately to preserve.

When the union shop is adopted through voluntary agreement, as it has been in cases covering millions of workers, it deeply undercuts the freedom of the individual. To hold his job he is required to join the union and support it financially whether he wants to or not. In the case of such voluntary agreement, however, the government takes no direct part in thus destroying the freedom of its citizens. It is essentially a private transaction.

Tyranny is the Word

But in the steel case the federal government becomes a party to a direct attempt to impose the union shop. Instead of protecting its citizens in their right to earn a livelihood, the government forces certain of them to join and support a private organization which they have clearly indicated they do not want to join. This they must do to hold their jobs. Tyranny is the accepted designation of government coercion of this kind.

It may be objected that the Wage Stabilization Board merely recommends the union shop, does not order it. This was also true of the action recently taken by a President's Emergency Board, which also "recommended" that working agreements between the

railroads and about a million non-operating railroad employees include a provision for the union shop. A government recommendation, however, can easily be given much of the force of an order, particularly by the calling of a strike to "uphold the hand of the government."

It seems entirely clear that in trying to impose the union shop on the steel industry the Wage Stabilization Board has completely lost its bearings. It was set up to handle labor problems to tide over an emergency. Now it comes up with a revolutionary modification of labor relations in the steel industry which, if adopted, would become a permanent part of the institutional machinery of the industry.

"Too Much Like Hitler"

Early in World War II an effort was made to have the federal government order the union shop for a group of organized coal miners. President Franklin D. Roosevelt, who will go down in history as one of organized labor's greatest champions, blocked it. "That," he said, "would be too much like the Hitler methods toward labor." But now, with supreme irony, the federal government fosters this Hitlerlike method toward labor ostensibly to advance our conflict with Stalin.

In persuading the Wage Stabilization Board to sponsor the union shop for steel workers, there is every reason to believe that the union leaders have trapped themselves. If the government imposes the union shop, a next step clearly becomes necessary. This is government regulation of the union in order to provide a modicum of protection for the minority that would be forced by the government to join against their will. It could be that for a time the government would ignore this obligation. But, having granted the union the power to eliminate the minority, it would sooner or later be forced to regulate the use of that power. Thus free collective bargaining and freedom itself would be the losers.

An Issue of Basic Principle

Resistance to a government-sponsored union shop for the steel industry is bound to bring harsh denunciation both from the administration and union leaders who have teamed to back it. Not only does the union shop relieve the union leaders of the problem of recruiting members, it also eliminates a group of workers that they stigmatize as "free riders"—namely, those who work for companies which have a working agreement with a union but do not join the union. In the basic steel industry about 10 per cent of those who work for companies with union agreements are not members of the union. Such a small percentage of non-members is obviously no threat to the "security" of the union, although that is what the drive for the union shop ostensibly is designed to protect.

In the reporting of the present labor dispute in the steel industry virtually all of the attention has been focussed on the handling of the issue of a wage increase and how large it should be. This, to be sure, is vitally important. Mobilization Director Wilson has said it is "a serious threat to our year-old effort to stabilize the economy." But certainly of comparable importance is the tremendous issue of principle raised by the government's backing of the union shop for the steel industry.

If the position of the Wage Stabilization Board on the union shop prevails, our government will have blunted the arms we are forging to fight for our freedom abroad by undermining a major bulwark of our freedom right here at home. At this critical time in the struggle to preserve and protect our freedom such a subversive course should be resisted to the limit.

McGraw-Hill Publishing Company, Inc.

In Defence of the Realm

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Have you ever designed an aircraft?

(Above) left to right, S. D. Davies, Chief Designer, A. V. Roe; W. S. Farren, Technical Director, A. V. Roe; S. Camm, Chief Designer, Hawker Aircraft; T. O. M. Sopwith, Chairman, Hawker Siddeley Group; Sir Frank Spriggs, Managing Director, Hawker Siddeley Group.

Ask Sydney Camm, Hawker Chief Designer, that question and he'll tell you no one man *designs* the aircraft of to-day. The modern jet fighter springs from one man's conception carried through by a complex team of airframe designers, aerodynamicists, process executives, stress analysists, wind tunnel men, weight control technicians, hydraulic experts . . . many, many men guided by many, many years of experience. As one man welds these individual experts into a team which thereby designs brilliant aircraft, so the Hawker Siddeley Group organises its member companies as a team, by whose association even better and greater aircraft are produced. Largest of its kind, this great industrial commonwealth now employs all its mighty resources in building the defensive strength of the Free World.

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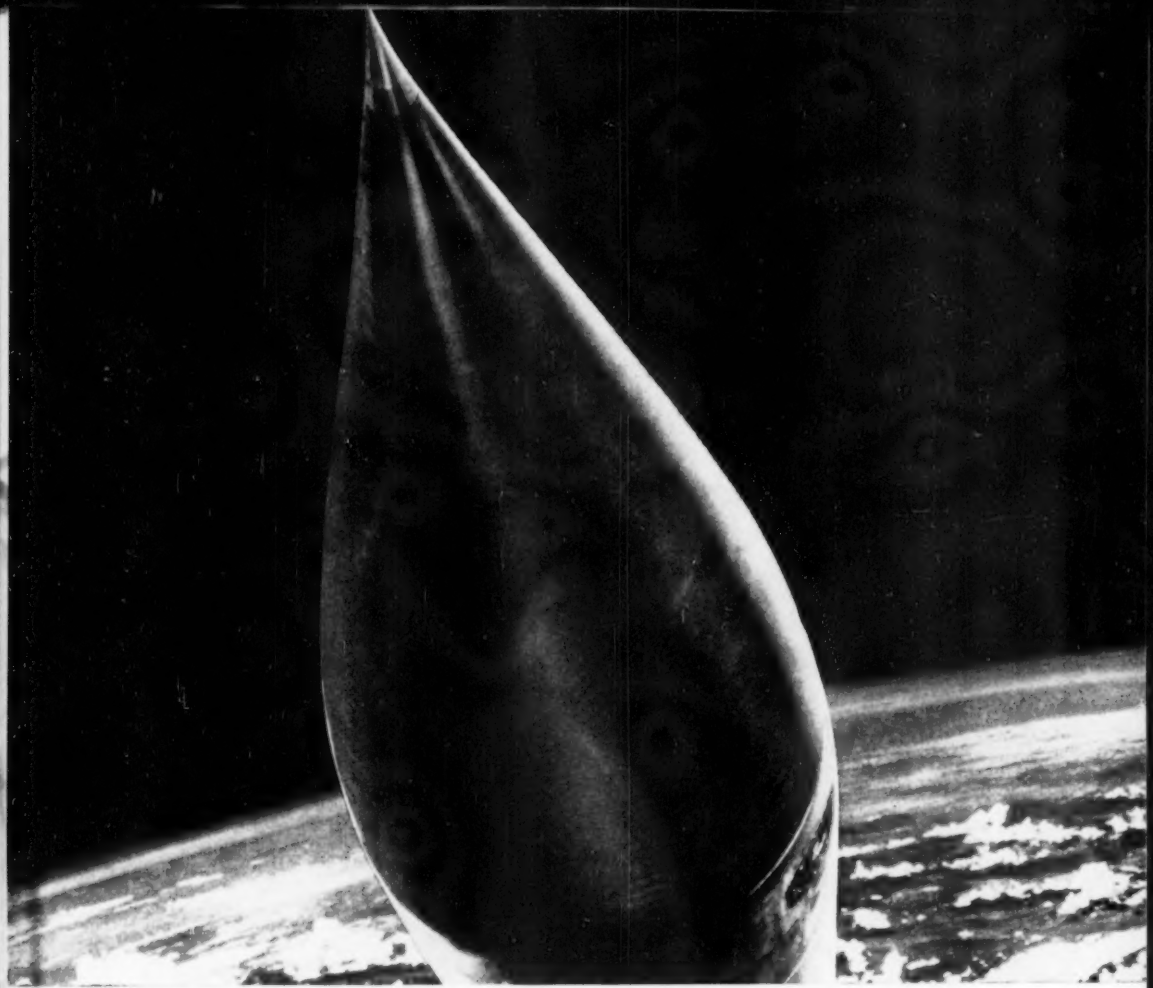

TAKES ITS G's WITH A GRAIN OF SALT...

Accelerometer
(half size)

Literally, a few grains of salt in the form of barium titanate crystals have helped unravel complex mysteries of supersonic flight. For these elements are the heart of a new Bendix-Pacific miniature accelerometer which telemeters accurate G-measurements in guided missiles.

Bendix-Pacific standard telemetering assemblies, radar equipments, radio-control systems, servo components and other electronic devices are making a vital contribution to the rapid development of aircraft and guided missiles. The leadership of these products has been achieved through advanced design, reliability and ultra-compactness. To insure this leadership for the future, more than 400 people are working in the company's well-equipped Development Laboratory. Included among many important projects is extensive research work in electronic subminiaturization.

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Interim Aircraft Results

	First Quarter Fiscal Year 1952	1951	Increase
North American Aviation			
Sales (000)	$52,695	$34,067	54.7%
Net before taxes (000)	3,618	2,892	25.1
Profit margin	6.9%	8.5%	
Net after taxes (000)	$1,575	$1,335	18.0
Profit margin	3.0%	3.9%	
Earned per common share	$0.46	$0.39	18.0
Douglas			
Sales (000)	$81,491	$39,518	106.2%
Net before taxes (000)	5,166	3,231	59.9%
Profit margin	6.3%	8.2%	
Net after taxes (000)	$1,997	$1,682	18.7
Profit margin	2.5%	4.3%	
Earned per common share	$1.66	$1.40	18.7%
Republic			
Sales (000)	$66,423	$19,435	241.7%
Net before taxes (000)	4,539	1,037	296.1
Profit margin	6.8%	5.3%	
Net after taxes (000)	$1,357	$405	235.1
Profit margin	2.0%	2.1%	
Earned per common share	$1.35	$0.40	235.1
	Six Months Ended Mar. 31 1952	**1951**	
Beech			
Sales (000)	$39,920	$13,075	128.9%
Net profit after taxes (000)	916	296	209.5
Profit margin	2.3%	2.3%	
Earned per share	$1.53	$0.39	209.5

Aircraft Sales Trend Continues Up

Quarterly reports show accelerating rates of deliveries and earnings, but taxes serve to level profits.

A sharp increase in aircraft deliveries and sales is evident in a number of quarterly reports being released in the industry. Earnings are also rising.

▶ **Accelerated Trend**—The indications are that the difficult and time-consuming tooling-up period may have been largely completed for much of the industry during 1951. This has now permitted an accelerating trend of sales with a slower degree of climb in the earnings curve.

This becomes evident in an examination of the interim results now available and summarized in the accompanying table.

• **North American.** NAA, for example, shows an increase of 54.7%, with sales of $52.7 million, for the first quarter of its 1952 fiscal year, compared with the like 1951 period. But, due to shortages of engines and other factors, sales were down from the $59.8 million shown for the three months ended Sept. 30, 1951.

For the current quarter, despite the squeeze on profit margins and higher taxes, net income was up 18%. This meant a net profit of about $1.6 million or $0.46 per share compared to $1.3 million or $0.39 a share for the corresponding 1951 period.

• **Douglas.** Similar gains in sales and earnings are demonstrated by Douglas. For the three months ended Feb. 29, 1952, the company more than doubled its sales (to $81.5 million) as compared to the same 1951 period. An almost steady rise in sales has been underway since the first quarter of 1950 when deliveries aggregated but $26.2 million. The current quarter showed a 59.9% increase in net operating income over the same period in 1951. But after taxes the gain was 18.7%.

• **Republic.** A far more dramatic showing is revealed by Republic's 1952 first-quarter report. Sales were $66,423,000—the highest for any quarter in the postwar period. A gain of 241.7% is indicated compared to the first quarter of 1951. With a slightly higher profit margin, net before taxes gained 296.1%. Higher taxes cut the net profit margin to 2.0%, but net income increased 235%. Republic was able to accelerate its output at a fast clip as it had a model available for production when the Korean war broke out. An indication of Republic's great strides is the fact that total sales were about $6 million in each of the quarters during the first six months of 1947.

• **Beech.** Gains are being demonstrated by Beech in a convincing manner. With six months of its fiscal year completed, sales show a 128.9% gain over the same period a year ago. Available reports do not disclose the earnings before taxes. In any event, the net income reveals a 209.5% gain to $916,000, or $1.53 per share, for the current six months, compared to $296,000, or $0.49 for the same 1951 period.

Beech enjoys a profitable commercial business as well as Canadian Government bookings, both exempt from renegotiation. Somewhat lighter tooling expenses have also been experienced by Beech. At the present rate, sales for the fiscal year to end Sept. 30, 1952, may double by a wide margin the $3.8 million established for the 1951 year. Net income may also double the $740,000, or $1.23 per share reported for last year.

• **Grumman.** While no interim reports have thus far been reported by Grumman, higher sales and earnings are also publicly indicated. At the recent annual stockholders' meeting an official asserted that sales may reach $250 million for 1952. This would represent a gain of better than 49% over 1951 sales of $167.7 million. With the same or even slightly lower profit margins, net earnings could exceed the $5.5 million or $2.73 per share of 1951 by a comfortable margin.

• **Convair.** The chairman of Convair, who has been particularly outspoken against high taxes, predicted at his company's annual meeting that earnings for 1952 will be at least as good as in 1951. As if to support this claim, the quarterly dividend was boosted from 35 to 40 cents a share.

▶ **Profit Picture**—An examination of the interim accounts of all reporting aircraft companies shows that a definite squeeze on profit margins continues. In fact, the profit margins before taxes for North American and Douglas (for the current period 6.9% and 6.3% respectively) are lower than the experience for all of 1951. Republic, having been in continuous production on virtually the same type plane, demonstrated a slightly higher profit margin for the first quarter of this year.

In all cases examined, higher tax rates served as a great leveler of earnings, reducing net profit margins to the 2% level with the highest point at 3%.

—Selig Altschul

Airlines Hard Hit by Fuel Restrictions

- **Oil strike added to other causes of revenue losses airlines have suffered so far this year.**
- **Already-tight supply of aviation gasoline is cut to 65% of each carrier's March consumption.**

U. S. Interior Department last week ordered airline operations cut to an estimated 70% of normal for May unless the oil strike ends. The strike has slashed the already-tight supply of aviation gasoline possibly in half.

The order hit an industry already suffering from earlier blows to 1952 revenues and earnings—closing of Newark Airport, a series of major crashes, and increased expenses.

It prohibits using more than 65% of March consumption of each carrier and non-carrier aircraft.

Administrating agency is the Petroleum Administration for Defense (PAD). A PAD spokesman told AVIATION WEEK the ban would come off or else be modified when the oil strike ends. He said there shouldn't be much lag in getting supplies rolling again—perhaps about a week after strike's end.

▶ **Order Specific**—Wording of the restrictive order is specific:

"Carrier and non-carrier aircraft are prohibited from accepting delivery during the 28 days starting May 6 of more than 65% of the amount of aviation gasoline they used during the month of March, 1952."

Military airlift flights later were exempted from the PAD order upon request from the Air Force.

Private aircraft pleasure flying is stopped outright. Here's how the order defines permitted non-carrier flying:

"A. Any use in connection with an activity relating to the training and maintenance of the proficiency of airmen, fixed-base or charter operations, or the Civil Air Patrol.

"B. Any other use including military, agricultural, health, governmental, commercial or industrial except the use of aircraft primarily for pleasure or sport activities."

▶ **Enforcement**—The user must sign a statement on each fuel delivery stating that he is using the fuel "only in conformity with the order." The fuel companies are forbidden to deliver aviation fuel without such written certification. And the fuel companies are ordered to file each certification for two years, so Interior and other enforcement agencies can check up and prosecute.

▶ **Exceptions**—No exceptions are written expressly into the order. PAD will handle direct each special case or plea of hardship.

Any company or person claiming need for adjustment must contact the Refining Division, PAD, Washington 25. The claim must be that the order "works undue or exceptional hardship" or that "its application would not be in the interest of national defense or the public interest."

Main exceptions PAD may okay for airlines, according to Ray Gaillard, director of CAA's Office of Aviation Defense Requirements are:

- New planes that weren't in operation through March—the base period; and
- Military contract flights.

▶ **Other Type Operations**—PAD metes the same fuel restrictions out to foreign airlines; they are held to 65% of March deliveries of U. S. aviation gas.

Federal government aircraft are exempted from the restrictions; state and local governments are "generally" restricted to the same terms as the airlines.

A clause of the order exempts companies and persons from suits for damages and penalties for defaulting on contracts because of complying with the fuel restriction order.

About 35% of aviation gas production capacity was shut down early last week. The PAD order is designed to cut civil use about 30% in the 28 days from May 6. A PAD spokesman says that present aviation gas inventories could not be relied on because stocks have been abnormally low ever since the Korean war started.

With autos, it is different, he said. The companies have long-range stocks of auto gas, but they haven't been able to catch up with aviation demand. So the strike forced immediate cuts in aviation gas consumption.

Rescheduling of flights is the main direction of airline efforts to minimize loss from the average 30% cutback of May 6-June 3 schedules. And rescheduling also is necessary to get fuel on some routes, as some points, especially in the Midwest, are out of supply.

Whereas fuel stops are generally scheduled in low-tax states, they are now being scheduled in well-stocked cities, regardless of tax.

Airline officials disclaimed reports they would save fuel by such measures as reducing engine warmup time. Fuel waste is always the No. 1 economy any time, Capital Operations Manager R. W. Hardesty said, because fuel is the airlines' top expense. Scheduling is the main place to look for fuel saving, he said.

New Ditching Survival Plan Urged

By F. Lee Moore

New equipment for passenger survival after water landings may result from evidence CAB is now collecting from survivors of the Northwest DC-4 "ditching" a mile off Sand Spit Airport, B. C., in January.

Basic assumption up to now has been that passengers and crew could, within the minute or two the plane floated after landing on water: get out of their seats, find life jackets, put them on, find life rafts, find exits, get rafts and selves out, hold onto the rafts while inflating them and get everybody into the rafts. It had been assumed proper crew training would take care of this.

But only two of the six water landings by airliners since 1949 have been successful, and then only because the planes were within a few hundred feet of rescue facilities; powerboats pulled alongside immediately. In the other four water landings, 169 persons were lost and 89 saved. Three of these ditchings were within six miles of airports.

▶ **Recommended for Survival**—One of the seven persons saved from the Northwest DC-4 crash in which 36 drowned a mile off Sand Spit, Air Force Lt. Donald Baker, read into CAB investigation record these recommendations.

- **Flashlights**, bracketed to the walls on all transocean planes.
- **Life vests** easy to get into and rugged enough to take the wear and tear of an emergency.
- **Passenger briefing** on location and use of all emergency equipment.

Air Line Pilots Assn. seconded the motion. Northwest Airlines adopted these recommendations soon after.

But after 52 passengers drowned last

month in the Pan American DC-4 water landing five miles off San Juan, ALPA officially announced another important recommendation:

• **Relocation of rafts** in such a way that crew and passengers could follow the instinct of self-preservation—first get out, then get the rafts. This involves mounting the rafts on the inside of exit doors and windows and/or panels in the wings. A turn of two handles outside the plane would release a raft; it would be attached to a static line and supplied with a light.

Another recommendation comes from TWA Capt. Robert Buck, who told AVIATION WEEK four months ago that exposure clothing must be supplied with rafts or life vests to make survival possible if an airliner goes down in winter on the trans-Atlantic run.

If statistics don't show this, experience of the Sand Spit survivors does.

▶ **Survival at Sand Spit**—Here are high points of the official CAB exhibits that have been assembled so far by the CAB's accident investigators at Washington, D. C.:

• Just after midnight Jan. 19 an engine quit on a Northwest-operated DC-4 half way from Alaska to Seattle. The pilot informed CAA communications he would make an emergency landing at Sand Spit, and asked the Northwest base at Seattle to fly mechanics and a spare oil cooler there to repair the engine.

• From there, the story comes from the two airport witnesses and Lt. Baker, one of the 40 military personnel this flight was bringing back from Japan. (Baker was a navigator for four years; he talked with the pilots throughout the flight, checked the dead engine and oil leakage for them with a flashlight, and helped the co-pilot with the navigation; this makes him the star witness for CAB investigators, since the crew and 33 passengers later died.)

• Sand Spit was an emergency airport for Northwest, although two daily scheduled stops are made there by other airlines. The field is operated by the Canadian Board of Transport.

• In Sand Spit tower, a radio operator and a customs officer waited for the plane to land. The runway was lit by flare pots, because snow had covered the regular lights. Braking conditions were reported "fair," with one inch light snow on the runway. Wind was light, about 10 knots.

• The airport men estimate the plane touched down about one-third down the runway. Then the engines roared again and the plane took off, disappearing in a left turn into a snow flurry.

• When it failed to reappear, Radio Operator Thompson went to the runway end. He heard voices out on the water. He and the customs man went to the scene in a small outboard motor boat and found seven survivors. The left wing tip still was projecting from the wrecked plane resting on the bottom in 15 to 20 ft. of water. It was 4,500 ft. from and 26 ft. to the left of the runway end.

▶ **On the Plane**—Here's what happened to the plane, as told by Lt. Baker.

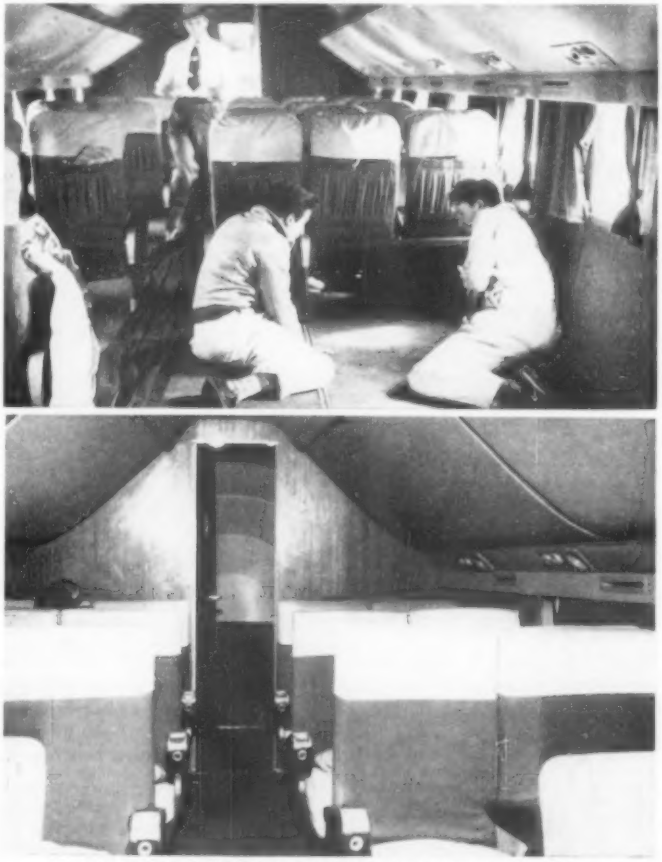
When the pilot apparently decided he didn't have enough runway to stop on his landing, he "poured the coal" to the three functioning engines. The engines seemed to take hold smoothly, but there was a vibration "somewhere in the nose" during takeoff. The plane flew out solidly, then it seemed to skid a bit, turning left. There was a jolt, the plane skipped, then hit again hard and the lights went out.

Baker's and most other seats on the left had pulled out of the floor. He had trouble unbuckling the seat belt and getting up.

Baker got out through an emergency exit onto the wing. The pilots, he said, attempted unsuccessfully to remove a life raft through the top hatch. He estimated about 30 persons were on top the fuselage, but they slid off one by one. "We had been out in the water about an hour and 15 minutes," he testified, before the boat appeared. There were then but seven survivors.

▶ **Crash Cause**—There are two major theories why the plane didn't continue climb after takeoff and they depend on whether the wheels and flaps were up or down.

• **Wheels, flaps down.** Douglas Aircraft figures indicate that a DC-4 with that load and one engine out will not climb much, if any, with wheels down



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Two interior views show how Sabena Belgian Airlines' DC-6 will carry 44 tourist-class passengers in the forward cabin (top photo) with three seats on the starboard side and two seats on the port side; lower photo shows rear which seats 16 first-class passengers, in two seats on each side of aisle. Sabena said tourist conversion of this standard DC-6 was completed in a little more than six hours.

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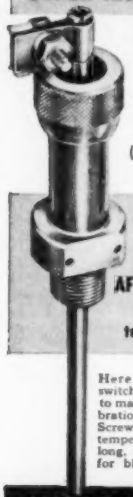

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and flaps down 45 deg. CAA Flight Operations Safety Agent Robert T. Johnson says the shear marks on the nose wheel assembly indicate it was not fully retracted when the plane hit.

A diver reported the flaps appeared to be down.

• **Wheels, flaps up.** Douglas figures also indicate that the plane could climb 200 ft. per min. with landing gear up, or up to 400 ft. per min. with gear up and flaps at 30 deg.

Northwest engineers and pilots say the shear marks on the nose wheel assembly indicate it was torn out in the up-and-locked position by the crash. And they note that the diver could not see the main landing gear.

Further analysis may clear up the wheels and flaps position, although salvage attempts were abandoned this winter.

If the wheels and flaps were up, Northwest Operations Manager Cox says NWA personnel have considered several possible causes for the crash: "Ice on the aircraft . . . deicer boots in operation at the time the captain elected to 'go around' . . . engines not delivering full power . . . delay in retracting gear or flaps . . . light turbulence or drafts. . . ."

▶ **Engine Failure Cause**—Cause of the engine failure cannot definitely be determined; salvage operations failed. The pilot believed the oil cooler was out of order.

▶ **Attempted Takeoff Cause**—The pilot believed he did not have reasonable stopping length left on the runway, so he tried to take off again for another try.

Survivor testimony indicates that few, if any, of the 43 aboard were hurt in the actual water landing, although some seats pulled loose. Most of them escaped from the cabin.

Cause of death of the 33 able-bodied military personnel and 3 crew apparently was the unavailability of light and life rafts when and where needed. Rafts were in the aft and forward ends of the plane.

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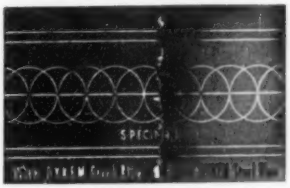

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Cox pointed out that "Northwest Airlines' ditching procedure . . . is considered comparable to any other. . . ."

► **Remedies?**—All aircraft equipment design and operating procedures are of necessity compromises—generally a balancing of initial economy against the long-range cost of fatal accidents. Airlines cannot afford every recommended improvement. So the problem of improving ditching survival chances isn't simple.

Cost of locating life rafts on panels that could be opened from outside the plane would be high, though not necessarily prohibitive.

But portable flashlights with automatic lighting at impact, located to show rafts and exits, would not be so expensive.

CAB Proposes New Liability Regulation

Civil Aeronautics Board has proposed a new regulation requiring all airlines to carry liability insurance.

Most airlines now carry more insurance than the CAB-proposed minimum, the Board said. So the new regulation would "make accepted business practice a formal requirement," added CAB.

But the Board pointed out that some lines operating without adequate coverage aren't big enough to take the financial risk of "self-insurance." This regulation "would protect the assets of air carriers against the effects which losses from accidents might otherwise have, and thus help assure the continued safety and quality of their services," CAB said.

The Board suggests this coverage: Passenger liability of $25,000 per person or aircraft seat in an accident; public bodily injury liability of $25,000 per person and $100,000 per accident for small transports, $250,000 for large transports (over 12,500 lb. gross weight); property damage of $100,000 for small transports, $250,000 property damage for large transports.

Pilots See Contract Trouble in Mergers

Air Line Pilots Assn. President Clarence Saven this month told Civil Aeronautics Board there will be trouble on the proposed airline mergers unless the Board approves consolidations contingent on adequate protection clauses for pilot employes.

In an ALPA brief of exception to the CAB examiner opinion favoring the Braniff-Mid-Continent merger terms, ALPA asks the following:

• **Five-year protection,** because a pilot's flying years are short and therefore seniority and furlough setbacks might

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hurt him more than they would other employes.

• **New employment contracts** be negotiated with the merged companies.

• **No pilot should lose** through circumstances of merger; he should not suffer financially in the merger through demotion, loss of earnings, establishing a home at a new base of operations, or furlough, ALPA says.

Styen said this applies to all pending mergers, including Braniff-Mid-Continent, Delta-Northeast-C & S, Capital Northwest and National-Colonial.

The ALPA brief claims that full terms of the presently effective pilot contracts with Braniff and MCA, for example, though approved by the CAB examiner, would be mutually impossible of fulfillment in merger—they would be contradictory.

Bonanza Starts Aircoach Service

Bonanza Airlines this month claims the first local service aircoach. Bonanza started a nonstop, 4-times weekly night coach over the 255 mi. from Phoenix to night spot Las Vegas.

Bonanza's fare of $12.75 nonstop is 5 cents a mile compared with trunkline night coach rates around 4 cents. But it is 25% under the regular Bonanza fare of 6¾ cents a mile for the regular three-stop Phoenix-Las Vegas run.

Bonanza dropped its system-wide excursion rates in favor of this pinpoint promotion plan.

Civil Aeronautics Board has approved the experiment for six months' trial.

Meanwhile, Northwest Airlines has asked CAB permission to drop the half-fare family plan used by many trunklines.

Northwest believes it has benefited little from the family fare, especially on the DC-3 operation. The family fare plan offers half-fare to family members accompanying a full-fare passenger during off-peak days in the week.

American has benefited most from the family fare plan, some CAB people report, because AA has worked hardest at selling it. American first introduced it on replacing 21-passenger DC-3s with 40-passenger Convairs. With the DC-3, American ran extra sections on weekends; with the Convair, it ran half empty on mid-week flights. Family fare promotion is the "peak leveler."

Aussies Hike Fares

(McGraw-Hill World News)

Melbourne—Australian National Airways and Trans-Australia Airways have increased fares and freight rates this year by about 15% and other airlines have introduced rates 10-20% above those of last year. And the operators claim that even with the increases Australian domestic airline fares are the lowest in the world. Sharp rises in wages and supply costs are given as the reason for upping fares.

Dove Restricted

(McGraw-Hill World News)

Melbourne—The de Havilland Dove light transport has been restricted to 3,000 hours by the Australian Department of Civil Aviation, as a result of a series of crashes here. The restrictions hold force pending certain modifications which are being made on the plane.

Study of a wreck indicated that the cause was due to fatigue failure of the lower boom of the center section spar. The plane was operated by Airlines (Western Australia) Ltd. A certain type of aluminum alloy is involved—detailed investigation is being made on certain other types of planes known to use this alloy, including U. S.-built aircraft.

SAIDE Granted Egypt Subsidy

(McGraw-Hill World News)

Cairo—A provisional subsidy of $120,000 has been approved for SAIDE (Service Aeriens Internationaux d'Egypt) by the Egyptian cabinet, conditional upon a check of the carrier's accounts by the Commerce Ministry. An additional allocation of $285,000 for 1951-1952 losses was shelved by the cabinet.

During 1950 SAIDE lost $416,000 on all routes, according to the Civil Aviation Department.

The cabinet has asked that a ministerial committee be formed to determine the conditions which would govern payment of subsidies to Egyptian aviation firms.

Aviateca Shakeup

(McGraw-Hill World News)

Guatemala City—Several employes of Guatemala's government-owned airline, Aviateca, were charged with defalcation of funds "in excess of $75,000" and four of them jailed, following a federal investigation of the airline's finances last month. In addition, the company's president and general manager, Col. Gonzalo Yurrita Nova, has been relieved and Ricardo Rodriquez Paul named to succeed him.

Defense Needs More Scrap

Canada to Drop Tariff on Aircraft

Ottawa, Canada—Finance Minister Douglas Abbott has proposed that foreign-made aircraft and engines of types not built in Canada be allowed free entry in the future to assist smaller air transport companies to re-equip themselves.

Until now, Canada has charged import duties on foreign aircraft to protect its aircraft industry.

Spanish Gains

(McGraw-Hill World News)

Madrid—Despite stiff competition from the government-owned Iberia Airline, the privately operated and youngest of Spain's two civil carriers, Aviacion y Comercio, S. A., carried 123,137 passengers in 1951, an increase of 42,068 over the previous year. Freight loads were up 205 tons over 1950 for a total of 515 tons.

Operating six Bristol 170s, the private carrier increased flying time last year 20.5% to reach 7,429 hours. Air mileage was up 18.7% over 1950 to new high of 1,098,408.

SHORTLINES

▶ **Air France** has started New York-Mexico City service with one flight a week, will add a coach flight June 3. First class fare is $495; coach rate was not announced.

▶ **American Airlines** has started "an intensive campaign" to sell air freight service to the $600-million Los Angeles apparel-making industry for shipping to out-of-state markets.

▶ **Capital Airlines** is service testing the Westinghouse de-odorizer ozone light bulb modified to aircraft 28v. dc current

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Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,
Senior Member, Aviation Writers Assn.

Recently, the Whittaker people asked me to do a reporting job on aircraft valves and the men and women who make them.

Why me? What did I know about valves, or care, for that matter? And why valves? There's color in an airplane but where's the romance in a valve?

Webster defines a valve as a "contrivance or arrangement" used to open or close a passage to permit or stop the flow of a liquid, gas, vapor or loose material in one direction and close against its return . . .

When I first entered the Wm. R. Whittaker Co., Ltd. plant on N. Citrus Ave. in Los Angeles, I had little more than Webster's definition to go by. A valve was simply a gadget to be opened or shut, with a good many of them required in planes and power plants.

Then I realized that an airplane cannot function without valves—any more than can the human heart. At Whittaker, I found that valves aren't gadgets at all, but masterpieces of precision, designed and built for unerring control in their crucial functions.

I saw how valve failure can wash out a million dollars worth of plane. I discovered that an efficient valve, in intricate coordination with its actuator, requires top engineering, top craftsmanship and can take a year to eighteen months in development time. In short, I found, at the Whittaker Company, a fountainhead of specialist "know how" turning out watchmakers' dreams.

Here, right in the backyard of my own aviation beat, is a company that grew in nine years from one main idea into a vital defense concern mass-producing critical valves of acknowledged superiority for the planes of every major American manufacturer.

A story here? You bet there's a story in any young, energetic outfit that has gone all out in design, production and financing to keep pace with the industry. In each phase there's a special story. It's been a struggle against odds . . . and there's always drama in that.

Whittaker has had problems, many of them. Those tangles were unsnarled with the same sort of resourcefulness that made older and larger firms the great air plants they are today. There have been mistakes, too, but for each mistake there has been a remedy. Problems and mistakes are not unknown in aviation's headlong technological rush. It's the manner and speed with which they're handled and solved that counts.

From a single check valve manufactured when the company started, Whittaker has increased its production to more than 400 types today, specializing in fuel, hydraulic, hot air and pneumatic valves engineered and produced as a unit with their actuators and tested exhaustively in extremes of pressure, heat and cold, sand and dust, fungus growth . . .

The company, with more than $16,000,000 in backlog, takes pride in the confidence its products have won throughout the industry, in the Air Force and the Navy. It's this same confidence that has brought on one of Whittaker's greatest headaches.

I'll discuss this anomaly and other problems in succeeding issues and give you a cross section of the Wm. R. Whittaker Co., Ltd., together with a bit of its history, an outline of its achievements and a look at the men who made those achievements possible.

by Aviation Mart, with All-American Airways cooperation. AAA already has adopted it, uses one per DC-3. Original cost is $15.95, including voltage adapter, with 25% discount on quantity. Bulb lasts 3-6 months and is replaced at $1.30 each.

► **Civil Aeronautics Board** examiner recommends CAB approve merger of Empire and West Coast Airlines as originally suggested by the Board. . . . CAB has ordered Intra-Mar Shipping Corp. and Intra-Mar Air Freight Corp. to stop unauthorized international freight forwarding.

► **International Air Transport Assn.** is pressing for streamlined customs and immigration processing by nations because aircoach may double trans-Atlantic air passenger volume, making red-tape cutting more imperative than ever. . . . Association reports scheduled lines' 11,200 flights across the North Atlantic last year meant 18 planes were airborne on the route at all times; about 340,000 people, 34% of the passenger traffic, went by air.

► **Mid-West Airlines** ceases operation this week, on May 15, after recent denial of its application for certificate renewal. MWA asked and got CAB permission to stop flying May 15 instead of June 30 to save money for both airline and government.

► **National Airlines** has started daylight coach service Washington-Florida. . . . Company now offers intra-Florida commuters a "fly and drive" plan, providing car rental for 50 mi. driving at $7 a day.

► **Northwest Airlines**, through efforts of the CAA Office of Aviation Defense Requirements, was able to borrow two scarce R-4360 engines from Air Force and two from British Overseas Airways; PanAm also agreed to expedite overhaul of some NWA 4360 engines. Flooding of NWA's engine overhaul base at Holman Field caused the emergency request.

► **Slick Airways** ads in October issues of leading business journals will show airfreight rates including pickup and delivery of 100 lb. shipments at 70% less than that of air parcel post or air express.

► **United Air Lines** summer schedules offer capacity 28% above a year ago. . . . Company load factors January-April compare with a year ago:

	1952	1951
Jan.	68%	67%
Feb.	63%	68%
Mar.	67%	72%
Apr.	71%	77%

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT: BUSINESS: **"OPPORTUNITIES"** :EQUIPMENT :USED OR RESALE

RATES

UNDISPLAYED	DISPLAYED
$1.20 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.	*Individual Spaces* with border rules for prominent display of advertisements.
Position Wanted & Individual Selling Opportunity undisplayed advertising rate is ½ the above rates payable in advance.	The advertising rate is $15.65 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.
Box Numbers count as one line.	
Discount of 10% if full payment is made in advance for 4 consecutive insertions.	*An advertising inch is measured* ⅞" vertically on one column, 3 columns 30 inches to a page.

BE A UNITED PILOT

Applications Now Being Accepted For Next Training Class

Have a career in commercial aviation with one of the nation's leading airlines. Pay is excellent, and there are ample opportunities for advancement. Retirement-Income Plan, broad Insurance Program and many more benefits.

QUALIFICATIONS:

Age: 21 to 30

Height: 5'6" to 6'3"

Vision: 20/20 without correction

Education: High School graduate

Citizenship: Must be U.S. citizen

Flying Experience: Must have valid CAA commercial license

Apply now to:

UNITED AIR LINES

Write C. M. Urbach, Dept. AW
United Air Lines Operating Base
Stapleton Field, Denver 7, Colorado

Aircraft Tool Design AND Manufacture

We have available capacity NOW

ENGINEERING & MANUFACTURING CORP.

P. O. Box 479 Galveston, Texas

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITION VACANT

HELICOPTER PILOTS and Mechanics wanted with mountain or tropical experience for varied projects. Interesting work. P-4177, Aviation Week.

POSITIONS WANTED

A HIGHLY Skilled Airline Transport Pilot with 5 years airline flying and a total of 12 years active flying desires a position with a future as Company pilot. At present flying captain on executive aircraft. Excellent references and resume upon request. PW-3992, Aviation Week.

AIRLINE TRANSPORT Pilot desires reliable executive pilot position for secure future and to establish a home for family. Presently flying Capt. on small airline. Age 27, married, 2 children. 5200 accident free hrs. with all ratings including A.T.R. exper. DC-3, C46 Lockheed Beech, etc. Good position more desirable than high pay. PW-4120, Aviation Week.

PILOT AIRLINE Transport rating and navigators license total 8500 flight hours. Airline captain experience on Constellation, DC-3, DC-4, DC-6, and Convair 240 equipment. Navy time on flying boats. College graduate desires employment flying capacity. PW-4160, Aviation Week.

12 YEARS Experience Instruction or Maintenance any type aircraft armament systems, also licensed aircraft and engine instructor and mechanic. White, 36, married, no children, prefer overseas assignment. PW-4168, Aviation Week.

FOR SALE

Beechcraft.

For Sale Beechcraft airplane, converted AT-11, manufactured Nov. 1944, modified for CAA certification by Spartan at Tulsa in 1946. Total time on airframe 3,500 hours, left engine 630 hours since overhaul; right engine 160 since overhaul. Constant speed propellers, ADF, 522 VHF, and Command radio. Licensed as of September 1950. All bulletins complied including hydraulic main gear drag links. Interior upholshed, 50 gallon cabin fuel tank. Apertures for vertical cameras. Plane painted white with red trim, excellent mechanical shape. Price $17,000. Wayne Thomas aviation editor, Chicago Tribune, Chicago, Superior 7-0100.

WANTED

C16F purchase, lease

or lease with option to purchase. Will consider trading C46A converted. W-4009, Aviation Week.

Wanted

LOCKHEED LODESTAR

Send full details to Jack Hale

OHIO AVIATION COMPANY

Dayton Municipal Airport Vandalia, Ohio

WANTED

12D40 Propellers! ! !

Also, Hubs and Parts! ! !

Spider — 51448 Barrel — 50384

NATIONAL PROPELLER CORP.

6401 Carleton Ave., Seattle, Wash.

HELICOPTER SPECIALISTS

TWO MEN WANTED
FOR
LONG-TERM PROJECT

AERODYNAMICIST

Prefer man with B.S. in aeronautical engineering and 4 years experience in aerodynamics, 2 of them in the helicopter field.

DYNAMICIST

Prefer man with B.S. in aeronautical or mechanical engineering and 4 years experience in dynamics, 2 of them in the helicopter field.

Interesting work and ideal conditions with leading firm.

WRITE
HUGHES
AIRCRAFT COMPANY
CULVER CITY
CALIFORNIA

ENGINEERS

Our military airframe design program offers excellent opportunity to engineers with airframe experience. We have openings in structures, layout and detail. Small expanding company. Overtime work schedule.

ANDERSON, GREENWOOD & CO.
Municipal Airport Houston 17, Texas

PRODUCTION MANAGER WANTED

Industrial & Electrical Products—Company has top reputation and 400 employees—Present Manager moving up—Cooperative associates — Interesting future — Excellent compensation arrangements—Please give full data including requirements and enclose recent photo.

Several positions also available for graduate engineers.

M. G. CHAMBERLAIN & COMPANY
Industrial Consultants
8345 W. Olympic Blvd. Beverly Hills, Calif.

ENGINEERS

GOODYEAR AIRCRAFT

CHALLENGE AND CAREERS
FOR
ENGINEERS and SCIENTISTS

GOODYEAR AIRCRAFT CORPORATION
RUNS THE GAMUT OF PROJECTS

Navy blimp and the most advanced jet fighter, commercial amphibians and helicopters, guided missiles and radar screens, electronic computers, tow targets, convertiplanes, gun mounts, fuel tanks, wheels and brakes, and stratosphere balloons are on the board or in the production shops of

Goodyear Aircraft Corporation

Careers are being built on the solid foundation of
Goodyear Aircraft Corporation
a subsidiary of
The Goodyear Tire and Rubber Company

ENGINEERS

AERONAUTICAL
MECHANICAL
ELECTRICAL
AERO DYNAMICISTS
ELECTRONICS
CIVIL
INDUSTRIAL
PHYSICISTS

NEEDED TO WORK ON

RESEARCH DESIGN DEVELOPMENT

NEEDED ALSO ARE

TOOL PROCESSORS TOOL DESIGNERS TOOL PLANNERS
PLANT ENGINEERS
METALLURGISTS
HEATING & VENTILATING ENGINEERS

G.A.C. offers a planned educational advancement program applicable to experienced undergraduates as well as to graduate engineers who are experienced or inexperienced in the aeronautical field.

Salary positions with bonus for extended work week. Free insurance, liberal vacation plan and other benefits are available.

Prompt and serious consideration will be given your inquiries addressed to:
Mr. C. G. Jones, Salary Personnel Department

GOODYEAR AIRCRAFT CORPORATION
AKRON 15, OHIO

OPPORTUNITIES

Expanding C-119 and C-123 Aircraft Program at Willow Run offers fine opportunities and steady employment for qualified men

- Tool and Die Engineers
- Industrial Engineers
- Plant Engineers
- Time Study Engineers
- A and E Mechanics—Licensed
- Tool and Die Designers

KAISER-FRAZER CORPORATION

Willow Run (near Detroit), Michigan

MARTIN

Offers the Greatest Diversity of Projects

to

Aerodynamics
Structures and
Electro-mechanical
Design Engineers

Martin has the greatest diversity of projects of any aircraft company in the East. Offers greater Opportunities for development, career positions for qualified engineers. Submit strictly confidential resume outlining qualifications in detail. Personal interviews arranged.

THE GLENN L. MARTIN CO.
Personnel Dept.—Baltimore 3, Md.

A GREAT OPPORTUNITY

in a new and interesting field

MECHANICAL ENGINEERS

- Design and Layout
- Long Range Program
- Aircraft Experience desirable
- Expanding Organization

Submit resume to

FLIGHT REFUELING, INC.
P. O. Box 709, Danbury, Conn.

AC SPARK PLUG DIVISION

of

GENERAL MOTORS CORPORATION

PRECISION INSTRUMENT PLANT

Positions now available for highest caliber personnel in the field of airborne automatic, electro-mechanical control equipment.

MECHANICAL DESIGN ENGINEERS
ELECTRONIC ENGINEERS
SERVO ENGINEERS
ELECTRONIC DESIGNERS
MECHANICAL DESIGNERS

New and expanding division of an established firm with 20 years of successful experience in the instrument field. Work involved deals with the manufacture and development of highly complex equipment of the most advanced type.

Write or Apply

AC Spark Plug Division
GENERAL MOTORS CORPORATION
1925 E. Kenilworth Place
Milwaukee 2, Wisconsin

The California Institute of Technology

Jet Propulsion Laboratory
Pasadena, California

. . . has several openings in the following engineering fields:

- Preliminary Design
- Engineering Analysis
  - Aerodynamics
  - Aerodynamic Heating
  - Heat Transfer
  - Thermodynamics
  - Dynamics
  - Structural Studies
  - Statistical Studies
- Structural Design
- Propulsion System Development
- Test Engineers—Wind Tunnel
  - Experienced in supersonic wind-tunnel tests desirable.

Excellent opportunity exists to learn all phases related to missiles, rockets and wind tunnel test operations. Apply giving details pertaining to academic background and work experience to

JET PROPULSION LABORATORY
4800 OAK GROVE DRIVE
PASADENA 2, CALIFORNIA

HELICOPTER TEST PILOTS

FOR EXPERIMENTAL TESTING

Must be thoroughly qualified to carry out all types of HELICOPTER flight testing. Minimum of 500 hours of HELICOPTER flight time required, preferably in experimental flying. Familiarity with CAA and armed-service test work desirable.

These positions are with an established rapidly-growing helicopter manufacturer offering attractive salaries and benefits. Our test pilots are aware of this ad. Send full details of experience and personal data to

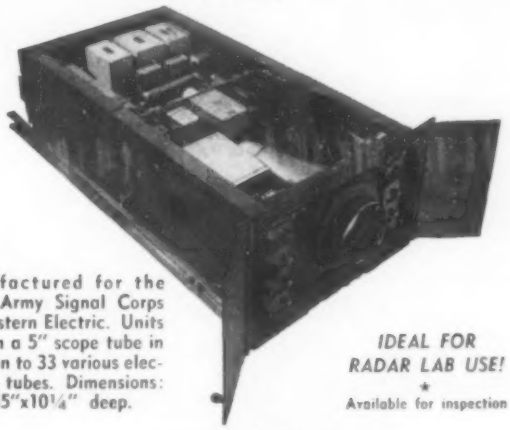
HELICOPTER TEST PILOT
P-4188, Aviation Week
330 W. 42 St., New York 36, N. Y.

Executive Aircraft Overhaul
AND
Conversion
Interiors, Radio Installations,
Engine Changes and Engineering
We can handle your job
TODAY
ENGINEERING & MANUFACTURING CORP.
P.O. Box 479 Galveston, Texas

Complete
Reliable
HELICOPTER SERVICE
• Helicopters for Lease — Anywhere
• Flight and Maintenance Training
NEW ENGLAND HELICOPTER SERVICE, INC.
Box 248 STATE AIRPORT HILLSGROVE, R. I.
World's oldest helicopter operator

BEECHCRAFT—C-45
Exceptionally Clean Executive Aircraft
Price $30,000.00
Contact
A. W. CRUSE
L. B. S. Aircraft Corporation
P. O. Box 123
Miami International Airport, Florida
Phone: 88-5257

FOR SALE!
39 UNITS BC957A RADAR INDICATOR
UNUSED



Manufactured for the U. S. Army Signal Corps by Western Electric. Units contain a 5" scope tube in addition to 33 various electronics tubes. Dimensions: 17¼x35"x10¼" deep.

IDEAL FOR RADAR LAB USE!
★
Available for inspection

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COMMERCIAL SURPLUS SALES CO.
4101 Curtis Avenue, Baltimore 26, Maryland
Telephone Curtis 3300

INSTRUMENTS
Authorized Factory Sales and Service
for
* Eclipse—Pioneer
* Kollsman
* U. S. Gauge
C.A.A. Approved Repair Station #3564
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Our stock of instruments is one of the *largest in the East.*
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Complete Overhaul & Maintenance of All Types of Aircraft
We have 20 complete PBY5A Aircraft
Prices starting at $25,000.00 each
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FOUR AT-21
Twin Engine
Located Mexico. Available for lease, sale or trade. Excellent cargo aircraft.
Box 395, Rochester, New York

AIRCRAFT PRODUCTION MACHINERY
IMMEDIATE DELIVERY
AIR TOOLS • ROUTERS
MAGNAFLUXES
MONTGOMERY ENGINEERING CO. Telephone
14195 Prairie Ave. Detroit 4, Michigan Tyler 4-2040

1—DOUGLAS DC-3
(Now receiving complete overhaul prior to modification. Can finish to customer's specifications.)
1—EXECUTIVE LOCKHEED LODESTAR
(Now receiving complete overhaul prior to modification. Can finish to customer's specifications.)
for details:
STONNELL & HOLLADAY
National Airport Washington, D. C.
Phone STerling 5753

G-21 GRUMMAN GOOSE

(Model JRF-6-B; serial 37818)

Although this aircraft was manufactured in 1944 a complete new hull and center section was installed in October 1946. Specifications are as follows: Airframe T.T. 2924 hrs. and 487 S.O.; engines 985-AN6B (487 hrs. S.O.); props Ham. St. 2D30-247, S.O. 487 hrs.; complete radio including ADF, HF and VHF (4 channels); day and night instrumentation including landing lights; radio compass BC433F; voltage 24V.—Foreign registration license expires May 20 and all bulletins complied with for relicensing in U. S. A. Present seating, 7 in cabin, pilot and co-pilot. (Brokers protected.)

$45,000.00 FAF New York

GORDON SMITH & COMPANY, INC.

51 East 42nd Street — New York 17, New York

Telephone: MUrray Hill 2-7327—(Cable-Gorsmicom, N. Y.)

PRATT & WHITNEY ENGINES

R2000-7

Ready for Immediate Delivery

Engine time 00:00 since overhaul by Pacific Airmotive Corp., Burbank.

Modified to latest airline specifications, complete with carburetors, magnetos and harnesses. Preserved for long time storage.

Also 83696 and 78105 cylinders, plus selected R2000 parts.

P. D. SMITH
AIRCRAFT ENGINE PARTS
10901 SHERMAN WAY
SUN VALLEY, CALIF.

B-23 DOUGLAS EXECUTIVE TRANSPORT

This beautiful deluxe long-range, high-speed aircraft has been recently entirely overhauled. Every item of equipment necessary for the comfort and convenience of executive travel has been incorporated. Spare engines, propellers and other components generally sufficient to maintain several years of uninterrupted operation are available.

TRANSPORT AIRCRAFT — **WILLIAM C. WOLD** ASSOCIATES — 516 FIFTH AVENUE, NEW YORK 36, N. Y.
Telephone Murray Hill 7-2050 — Cable Billwold New York

600 AMP

Reverse Current Relay AN3025-2
Hartman A702A New sealed cartons, pack expiration date 4-17-53.
Just one of many "hot" instrument and electrical equipment items in stock for immediate delivery—Others are:
AY203 & AY205 Autosyn Motors
AN5745-2 Accelerometers
Type E-21A Jet Tach (0-110%)
AN5773-1 Engine Gage
89 & 811 Cyl. Hd. Temp Gages
AN3201 and AN3202 Ammeter & Voltmeter
Thousands of others. Government Source Inspection or CAA Inspection as desired.

R. E. WHITE & ASSOCIATES
8919 San Fernando Rd.
Rockwell 91191 — **Glendale, Calif.**

New Mixture Controls

Manuf. by Stromberg

P/N A30041	P/N 392090
P/N A30117	P/N 395031

COMPONENT PARTS

P/N 22141	P/N 61110
22148	61219-G
22151	61250
22154	61251
22173	70938-K
22181	392683
60129	392708
60550	392737
60956	394077-Y

Important—Our new sparkplug overhaul shop allows us to make many popular types of sparkplugs available to you at a very modest price, so be sure to write us about your sparkplug requirements before you buy. We also have a fine stock of:

NEW SPARKPLUGS
In original boxes

C-35S	RC 35S
C-34S	RC 34S
LS 86	LS 87

Many other parts & Accessories available.

L & H SUPPLY, INC.
8202 Cedar Springs — Dallas 9, Texas
Dixon 5150

PROPELLERS

		Overhauled	New
C-46	Hydramatic	$2,800.00	
C-46	Curtiss Elec	700.00	$1,000.00
C-47	Hydramatic	600.00	850.00
C-54	Hydramatic	600.00	950.00
P51	Hydramatic	1,200.00	1,500.00
P-47	Curtiss Elec	1,500.00	1,600.00
B-25	Hydramatic	500.00	6-0.00
B-26	Hydramatic	500.00	600.00
DC-6	Hydramatic	10,000.00	3,000.00
B-29	Hydramatic	2,000.00	

HUNDREDS OF COUNTERWEIGHT AND OTHER TYPES AVAILABLE

BLADES

	Overhauled	New
Beechcraft Hydramatic	$215.00	$300.00
P-51 Hydramatic	100.00	125.00
C-54 Hydramatic	200.00	300.00
C-47 Hydramatic	175.00	200.00
6101A-12-18 BLADES	600 AVAILABLE! ! !	

GOVERNORS

	Overhauled	New
4G8G23G-1	$50.00	$100.00
4G8G23G	50.00	90.00
4G8G13G	45.00	75.00
4G8G30M	110.00	130.00
4G8P30M	120.00	160.00
1A2G-5	165.00	185.00

MANY OTHER TYPES IN STOCK
COMPLETE LINE OF 12D40 & 2D30 PARTS AVAILABLE! ! !

53345	51595	56371-20	51862	51430
52589	53302	56370-20	50386	51432
52595	53626	56371-25	51433	50109
53214	53216	52313	50804	56142

NATIONAL PROPELLER CORPORATION
6101 Carleton Avenue, Seattle 44, Washington
Phone: LAnder 7696

FOR SALE—TEST STANDS FOR JET ENGINE FUEL NOZZLES AND CONTROLS

2 for testing J42, J47, J48, and similar fuel nozzles.

1 for Flow Testing Fuel System Controls. Capacity 9400 PPH @ 500 PSI.

EX-CELL-O CORPORATION
Detroit 32, Mich.
MARTIN PLANT

NEW

WRIGHT 1820-62A-72A Engines

Aircraft Service Corporation
P. O. Box 123
Miami International Airport — Florida

PRATT WHITNEY ENGINES

Like New — Low Total Time — N.T.S.O.
New Factory Reconditioned Main Bearings 1830-92, 1830-90C, 1340-1, 985s.
Ignition as desired. Write to us for prices & details.

WALLACE AIR SERVICE
P. O. Box 2203. — Spokane, Wash.

WORTH WAITING FOR:

LOCKHEED PV-1

Speed 260 mph (T.A.S.) - Range 1500 Mi.

We have several PV-1 Venturas that are ready for immediate fly-away. They are new unconverted. One aircraft has only 440 hrs. since new—other has 1100 hrs. These are in unusually fine condition. Will stand rigid inspection. *AVAILABLE IMMEDIATELY.*

Call or Wire

LEEWARD AERONAUTICAL
Fort Wayne, Ind. Ph. H-2145 — or — Miami, Fla. Ph. 9-1218

P & W LODESTAR

Sperry A-12 Auto Pilot with Automatic Approach Control

N60100—very plush executive interior including deluxe lavatory, 6 chairs, divan, desk, hot cups, folding table, deicer boots, anti-icing, Collins Glide Slope Receiver, beautiful paint job—white and gray, 1800 total hours on airframe, new engines.

PAGE AIRWAYS, INC.
Rochester Airport — Rochester, N. Y.

IMPORTANT! ***Many items in this group have not been listed in previous ads!***

One of America's largest stocks of UNUSED

AIRCRAFT PARTS

We own and offer all parts listed — plus many thousands more — stocked in our Baltimore warehouse!

EXTRA SPECIAL!

OVER 6,000,000

AN525 WASHER HEAD SCREWS

All diameters and lengths, for example:

132,000	AN525-8-6	196,000	AN525-10-14
538,000	AN525-8-8	114,000	AN525-10-16
345,000	AN525-8-10	252,000	AN525-416-10
1,019,000	AN525-10-8	536,000	AN525-416-12
401,000	AN525-10-10	192,000	AN525-416-14
678,000	AN525-10-12	210,000	AN525-416-16

PLUS MANY OTHERS

43 PIECES

ENGINE QUICK CHANGE UNITS APPLICABLE TO GRUMMAN FM-1 AIRCRAFT. COMPLETE WITH ACCESSORIES

MISCELLANEOUS COMPONENTS

Quantity	Part No.	Mfg.	Description
45	AN4103-2	Clifford	Brass (Valve #U4785) Oil Cooler
38	18597-2	Airsearch	Aluminum Oil Cooler
120	MF9-713-15A	Vickers	Hydraulic Pump
700	TFD 8600	Thompson	Fuel Booster Pump
125	D7818	Adel	Anti-icer Pump
50	8P771-A	Pesco	Fuel Booster Pump
250	AN4014	Erie Meter	Wobble (D-3) Pump
308	1H260-K & KA	Pesco	Hydraulic Pump
19	AN5531-1	G. E.	Tach. Generator
1000	AN5780-9	G. E.	Wheel & Flap Position Indicator
400	AN5780-9	Weston	Wheel & Flap Position Indicator
16	76B19	Lewis Eng.	Cyl. Head Temp. Gauge
10	4682	Lewis Eng.	Air Temp. Ind.
31	47B21	Lewis Eng.	Temperature Ind.
12	47B22	Lewis Eng.	Temperature Ind.
20	47B23	Lewis Eng.	Temperature Ind.
36	47B24	Lewis Eng.	Temperature Ind.
10	76Z2	Lewis Eng	Air Temp. Ind.
11	76B4	Lewis Eng	Temperature Ind.
20	77C4	Lewis Eng	Temperature Ind.
21	77C5	Lewis Eng	Temperature Ind.
85	797TY79Z2	Weston	Left Wing Anti-icing
88	797TY73Z2	Weston	Right Wing Anti-icing
83	797TY74Z2	Weston	Tail Anti-icing
11	2227-11D-3A	Eclipse	Dual Tachometer
44	5BA25DJ4B	G. E.	DC Motor (½ HP)
83	A4934	Delco	Motor
50	RD82220	Holtzer Cabot	DC Meter
115	P4CA2A	Parker	Primer
70	AN3211-1	Scintilla	Ignition Switch
450	A-9 (94-32226)	Nasco	Ignition Switch
687	RS-2	Mallory	Selector Box
90	JH950-R	Jack & Heintz	Starter Motor
492	S-841 (94-32253)	Electronic Labs	Box
53	AN6203-3	Bendix	Accumulator 10°-1500 P.S.I.
1000	13018-A	Bendix	Interphone Box
140	K14949E	Marquette	Windshield Wiper Kit
188	EYLC-2334	Barber-Colman	Control
11	12086-1C	Eclipse	Amplifier
174	450-0	Skinner	Gasoline Filter
250	558-1A	Eclipse	Oil Seperator
100	716-3A	Eclipse	Generator (NEA-3A)
37	117-47	Edison	Detector
89	318	Edwards	Horn
20	794-F	Stewart Warner	Heater
230	921-B	Stewart-Warner	Heater (200000 BTU)
340	981280	Kidde	Co2 Cylinder
85	18924-2	Adel	Lock Valve
90	923748	Kidde	Oxygen Cylinder
80	DW28	Eclipse	Transformer
97	6041H-146A	Cutler Hammer	Relay (B-12)
22	0655-D	Aro	Oxygen Regulato
148	PG208AS1	Minn. Honeywel	Air Ramp Switch
33	DW47	Eclipse	Transformer
11	DW33	Eclipse	Transformer
65	ASDC2	CO2 Mfg. Co.	Fire Detector
600	ND21	American Gas Accumulator Co.	Time Delay Relay
30	U6005-DV5	United Air Prod.	Oil Temp. Reg. 5°
99	UA-3160	United Air Prod.	Oil Temp. Reg. 6°
98	UA-3160C	United Air Prod.	Oil Temp. Reg. 6°
73	UA-6007-CF-DV5	United Air Prod.	Oil Temp. Reg. 7°
14	UA-6009-S-30	United Air Prod.	Oil Temp. Reg. 9°
11	UA-6012K-S30K	United Air Prod.	Oil Temp. Reg. 12°

CARBURETORS! MAGNETOS! SPARK PLUGS!

Quantity	Part No.	Description
247	PD12K10	Stromberg injection Carburetor
19	1375F	Holley carburetor
407	SF9LN-2 (manufacturer's part No. 10-12453-6 Spec. AN9511)	Bendix Scintilla Magneto
42	SF5RN-12 (manufacturer's part No. 10-26170-1)	Bendix Scintilla Magneto
185,000	LS4AD1	Spark Plug (Aero)
30,000	LS-659A	Bendix Scintilla Spark Plug

SPECIAL GROUP!

Ideal for tear-down for parts

Quantity	Part No.	Description
328	PD12K10	Stromberg injection carburetor
236	PR48-A1	Stromberg carburetor
89	PR48-A2	Stromberg carburetor
31	PR48-A3	Stromberg carburetor

PRATT AND WHITNEY AIRCRAFT ENGINE PARTS

Quantity	Part No.	Description
166	1045A	Bearing
500	3506	Flange
130	8888	Follower Ass'y
814	35814	Blower Ass'y
53	48362	Shaft
175	48363	Shaft
56	48392	Sump
390	48461	Gear
78	76236	Gear
1178	84089	Bearing
113	84487	Housing
77	84591C	Nose Housing
200	48350-D	Crankcase Ass'y
200	84083	Cylinder
100	84084	Cylinder
200	84085	Cylinder

HUGE STOCKS OF ALL TYPES *AN* HARDWARE NEW — UNUSED. WRITE FOR DETAILED LISTINGS.

BEARINGS AIRCRAFT

Quantity	Part No.
18000	K3L-2
8600	K3L-R48
6000	KF4
3000	KF4H
30000	KP4R16-2
3300	KSF5
17000	BC5W11
28000	KS4A
7000	38KD4
6600	RE3MR3
5000	F35-14

ACTUATORS

Quantity	Part No.
42	400AJ3
161	420 EC
160	420 DY
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It's Time to Turn on the Lights

This year's crop of crashes has had two main causes—mechanical failure and bad weather instrument approaches. Most cases of mechanical failure stand a chance of being cured. The approach problem, however, has a rather gloomy outlook.

Effective visual aids—the remedy for many of these accidents—needs pushing.

▶ **Avoidable Crashes—The now famous "New York Series" included two crashes which most likely would not have happened had adequate visual aids been installed.** The term "visual aids" as used here means approach lights, runway lights and runway markings. "Adequately installed" means that pilots should not have to circle blindly in order to land.

• **The first crash, a Northeast Airlines Convair** at LaGuardia, was an approach to minimum conditions, over water, with no approach lights. We will not concern ourselves here with the possibilities that may have caused the trouble, such as instrument error, faulty windshield wipers, etc. Instead we will look at what could have prevented the accident. **Pilot opinion is that approach lights would have provided the additional guidance necessary for a safe landing in this case.**

• **The second crash, a U. S. Airlines C-46** near Idlewild, also occurred during bad weather. In this case the pilot made a successful ILS approach but lack of straight-in landing facilities made it necessary to circle the airport. **There is every reason to believe that proper landing aids would also have prevented this crash.**

It is interesting to note that ICAO long ago set an approach light standard. This is the centerline—ALPA or British Calvert system. While the U. S. has accepted some ICAO standards, such as nautical miles and new phonetic alphabet, we have not at this writing accepted the "official" approach lights.

▶ **Military Block**—Acceptance of ICAO standards is largely determined by the military. For instance, every U. S. civilian aviation organization voted against the nautical mile. The desires of the U. S. Air Force prevailed however, and that is now the American standard.

On the other hand, civilian aviation has long been in favor of centerline lights but, mainly due to objections by the Air Force and the Navy, we have not followed ICAO.

Navy objects to centerline lights because of poor forward visibility from jet cockpits. The Air Force has a requirement that every runway, regardless of length, have 1,000 feet of clear area off each end. It is difficult to justify this regulation, even considering jet aircraft.

CAA publishes a Monthly Summary of Air Traffic Control Operations showing statistics on bad weather flying. A typical month, January, 1952, shows the following: ILS approaches—scheduled airlines 16,179, the military forces 434; full GCA approaches—airlines 2,118, military 836. Scheduled airlines' annual average is 94% of all instrument approaches.

▶ **ICAO's System**—Further, the military have indicated that they are not interested in landings with less than one mile visibility. Airline minimums are already at ½ mile and are expected to drop. At visibilities above one mile almost any approach lights are satisfactory, but below that figure their usefulness falls off depending on the system. The ALPA-Calvert centerline lights are the only ones considered adequate at ½ mile and only the ALPA system meets 500-ft. requirements.

In view of these facts it appears logical that the ICAO-approved lights should be installed without delay so that those who need them may use them. Once this is accomplished, flying will be simpler and safer.

STRICTLY PERSONAL

Notes & Names

Who thought up the name for that new house organ—Kaman Performance?

We welcome several hundred new subscribers up at **Minneapolis-Honeywell** in Minnesota.

Chuckles from aviation editors everywhere, who noted that CAA's "news" dispenser, **Ben Stern**, put out a press release of several hundred words on **Phoebe Omlie's** resignation from CAA, with everything in it—except why she quit. (She didn't like CAA.)

Strictly Personal contributor **Hy Sheridan** has a story in that new magazine, Today's Science.

Hearty cheers to **Howard Hughes** for the mauling he's giving Reds and fellow travelers at his RKO shop in Hollywood.

Robert Nadal, one of the more aggressive personal plane salesmen of the postwar boom days, is moving up the executive ladder at Lincoln-Mercury div. of Ford. He was former general sales manager for Culver; now is L-M's manager of product sales and service.

Irv Stone, who has been pinch-hitting as Production Editor of Business Week, has returned to AVIATION WEEK and his old job as Technical Editor.

* * *

EXCLUSIVE!

Why I Landed at Newark

By "Babe" Meigs

*(When New York newspapers reported that Merrill C. Meigs landed his ship at Newark by mistake recently instead of at Teterboro—the first plane to land since Newark closed—Strictly Personal asked him how come? Here's his own story—***R.H.W.**

My Bonanza is equipped with a Lear Automatic Pilot and automatic altitude control. I took off from Princeton, got my heading and threw in the automatic pilot and altitude control, then proceeded to read the morning paper.

Arriving in the Teterboro area, I found a lot of smoke and haze. I called Teterboro Tower. They came in clear and strong. Told me to land on 240.

There was no traffic. I looked around for the airport—and there was 240 standing out as big as life.

So, I made the usual procedure. Called Tower on the downwind leg. Tower acknowledged. Same with base leg and final. As I was over the end of the runway, the Tower called and said they couldn't see me.

It occurred to me then that I was on Newark instead of Teterboro; however, since I am a Civil Aeronautics Administration consultant, I had authority to land anywhere so I decided to sit down and stop in and see the CAA representative at the airport.

Soon after, I took off for Teterboro.

My publisher friends seemed to find a story in this. As a result, I've been hearing from many old friends . . . so it was all to the good.

As Ripley would say, "Believe it or not."

Babe

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EDITORIAL

CAA Refuses to Divulge More Data

On Apr. 14 AVIATION WEEK filed a formal request with CAA requesting:

(1) A complete list of grades given to GS 13 & 14 employes—about 310 persons—"showing a breakdown for all four parts of the examination, and the overall grades for each," in the tests preliminary to the recent reorganization of the Office of Aviation Safety.

(2) Any good explanation, if any existed, as to why as much as 50% of each employe's total grade was based on the oral interviews, of which no transcripts were kept.

(3) A copy of the questions which were asked; the text of the written examination.

As we fully expected, CAA strikes out on all three queries.

This is similar to the response to our original question as to the cost of the reorganization (our own reporting efforts have since uncovered one official's estimate that $80,000 was spent merely on personnel travel alone, in connection with the reorganization).

We have received no answers to the seven vital questions asked on this page Mar. 24, one pertaining to the cost. These questions also asked why no transcripts were kept of either group or individual interviews? Why were veterans' rights ignored? Why were some individuals offered minor favors—such as choice of new geographical location—if they promised not to protest their assignments formally? One answer did develop—that a new Grade 14 post was, indeed, set up in each region, paying each of the seven hand-picked men more than $9,000 a year.

Admiral Horne, CAA Administrator, "regretted" that we did not seek enough facts from him and other authorized CAA officials. "We are always ready to cooperate in providing information," he wired. CAA is not answering our best questions. We and hundreds of OAS employes can only conclude that CAA doesn't dare reveal the whole story of the sordid manipulation it calls a "reorganization."

In this latest letter from CAA to AVIATION WEEK, dated May 1, Ben Stern (chief of information), in attempting to answer Question (2) above, merely repeats (without answering the question) much of the same refrain sung by OAS directors Hensley and Davis in their letter to us. ". . . Much of the following necessarily is a repetition of information previously furnished to you by Messrs. Hensley and Davis and published in the Mar. 31 AVIATION WEEK . . ." he writes. We spare you the repetition.

In denying our Request (3), Mr. Stern contends that this test (which was widely criticized in the OAS for its inapplicability to the employes or jobs under test) was "obtained from the Civil Service Commission . . . and . . . is not the property of CAA and the CAA is not authorized to make it public."

Mr. Stern takes note of the hue and cry about the emphasis that Hensley and Davis have put on "administrative" abilities.

"Since all of the new positions to be filled were primarily concerned with the direction and management of aviation safety programs, it was considered vital that only those individuals with ability to plan, direct, and supervise the work of others be selected. **It should be understood that all of the candidates considered were highly qualified technically; it was executive ability in addition to technical qualifications that the selection procedure was designed to identify.**" AVIATION WEEK stories and letters have shown this to be untrue in some instances.

As to our request (1), note this:

"In response to your request for a 'complete list of grades' given to those who participated in the examination, it is a standard procedure both in government and in those private industries which utilize competitive examinations to furnish information about scores only to the individual himself. The CAA already has furnished each of the individual candidates a greater amount of information than is customary in connection with Civil Service examinations. General dissemination of scores serves no purpose other than to provide a possible source of embarrassment to individuals whose scores were low."

And numerous OAS employes who have written to ask their bosses for more information as to why their grades were so low (some of these inquiries were not even acknowledged) will enjoy this:

"Individuals who may have thought that they had not been rated fairly had ample opportunity to protest their scores. All CAA employes have full appeal rights, not only through normal administrative channels, but to a CAA standing board of appeals and, if necessary, they may obtain special review by the Department of Commerce. The Standard Practice Manual, available in every CAA office, clearly explains every step in the appeal procedure."

This may sound very gracious and fair to a taxpayer uninformed about bureaucracy. But as for the federal employe himself, he knows better—unless he doesn't care about his future standing with his superiors anyhow.

"We regret," claims Mr. Stern, "that we are unable to give you all the material called for in your current request, but I think you will understand that this is impossible in light of long-standing and thoroughly justified procedures governing such examinations. Please feel free to call on us at any time we can be of service."

That fellow Stern is a card.

CAA's frequent offer to tell the facts about this squalid reorganization is a mockery. Let the record so show.

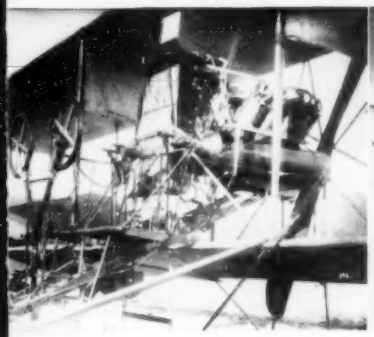
This closes the editorial series on the reorganization act itself. We are preparing a new series on this most important unit of CAA—where lack of ability can mean disaster in aviation. It starts elsewhere in today's issue. We invite our many new and conscientious correspondents to keep writing from their posts in OAS. Cleanups of such conditions do not come quickly or easily, as we all note from day-to-day developments that are uncovered by and about the Truman Administration.

The task is big. But the press should not merely sit idly by and deplore. The public wants facts. AVIATION WEEK will continue to probe inner workings of OAS that have never been publicized before. We intend to keep showing you exactly what OAS does and does not do to maintain aviation safety.

The press can thus set the stage for housecleaning. The cleanup itself is up to government or the People through their elected representatives.

—Robert H. Wood

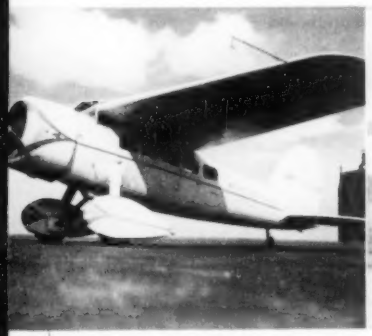
40 YEARS OF AUTOMATIC FLIGHT...BY SPERRY



1912 The first Sperry automatic pilot was flight tested in a Curtiss hydroaeroplane in 1912 at Hammondsport, New York. This was the world's first gyroscopic automatic pilot to fly an aeroplane.

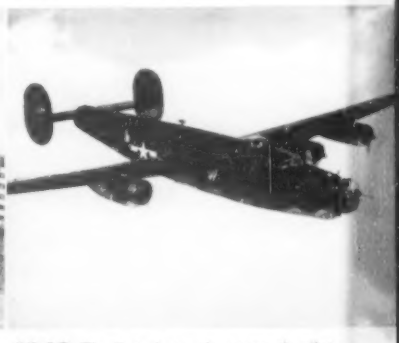
1914 Lawrence Sperry, in a public demonstration of automatic flight in Paris, 1914, won the International Safety Competition with his "stable" aeroplane.

1916 Ancestor of the guided missile was the aerial torpedo developed during 1916-18 by Sperry working with the U.S. Navy. These automatically controlled "flying bombs" were tested over Great South Bay, Long Island.



1933 Automatic flight again won public acclaim in 1933 when Wiley Post made the first solo flight around the world with the Sperry automatic pilot as his "co-pilot" in the WINNIE MAE.

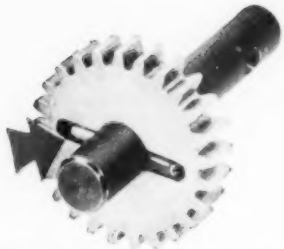
1937 First completely automatic landings were made by the U.S. Army Air Corps in 1937 by coupling radio aids to the Sperry automatic pilot.



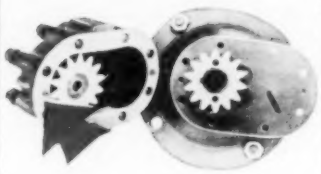
1943 The first electronic automatic pilots flew thousands of B-24's in World War II and advanced the art of precision bombing by providing an improved stable platform.

1947 The first "pushbutton" aircraft, U.S. Air Force's All-Weather Flying Division's C-54, equipped with Sperry automatic pilot and automatic approach control, crossed the Atlantic both ways in 1947 without human hands touching the controls—including take-offs and landings.

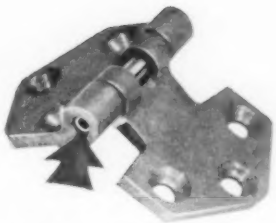
1952 The modern Gyropilot® flight control is the outgrowth of Sperry's 40 years of research, development and manufacture of automatic controls for aircraft. This versatile, all-weather pilot represents a high-performance technique for automatic control which is readily adaptable to all types of aircraft—airliners, executive craft, jets, helicopters, lighter-than-air ships and guided missiles. This technique pioneered by Sperry has led to a new fundamental concept of flight for the aircraft of tomorrow. Sperry Gyroscope Company Division of The Sperry Corporation, Great Neck, New York.



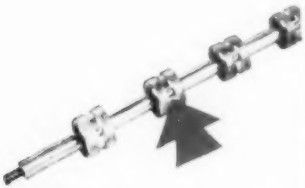
REPLACING A HUB ON A GEAR . . . Rollpin, self-retained in shaft, is simply snapped into molded slot to position sintered gear. This application, by Ditto Inc., effects major savings in assembly. Rollpin's high shear strength is particularly valuable here.



REPLACING A MACHINED PIN . . . In the lubrication pump assembly of the Cummins HR-400 diesel engine, two Rollpins are used as positioning dowels. Rollpins are self-retaining in production-drilled holes . . . quick to assemble and easy to remove.

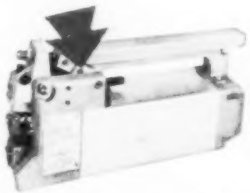


REPLACING A HEADED PIN . . . In this hinge pin application, Rollpin is simply and inexpensively driven in place, greatly reducing assembly costs. Constant spring tension holds Rollpin firmly in place . . . eliminates loosening of hinge due to wear.



REPLACING A SET SCREW . . . Paper feed rollers are quickly, economically pinned to shaft by Rollpins in this office machine made by Ditto Inc. Flush fit affords neat appearance . . . spring tension assures positive, permanent positioning of rollers.

REPLACING A RIVET . . . Rollpin serves as guide shaft for spring-loaded electrical interlock contacts. The Square D Company reports that rivet failure previously occurred at the clinched end under normal operating impact and vibration.



REPLACING A BOLT AND NUT . . . Rollpins act as fasteners and pivots for the linkages in this Miller Electric Welder. Rollpins may be used with a free fit in outer or inside members depending upon product design requirements.

6 more examples of assembly-time saving with ROLLPIN

TRADE MARK

Rollpins are slotted, tubular steel, pressed-fit pins with chamfered ends. They drive easily into holes drilled to normal tolerances, compressing as driven. Reaming, tapering, extra assembly steps are eliminated. Rollpins are *locked* in place by the constant pressure they exert against hole walls. Inserted with an automatic press or by hand, Rollpins are readily removable with a drift or pin punch—and reusable again and again.

Elastic Stop Nuts with the famous red collar are another ESNA® product

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Dept. R6-525, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send me the following free information on ESNA self-locking fasteners:

☐ Rollpin bulletin and sample Rollpins ☐ AN-ESNA conversion chart
☐ Elastic Stop Nut Bulletin ☐ Here is a drawing of our product. What fastener do you recommend?

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